

F601
A48

JOURNAL OF THE

LIBRARY OF CALIFORNIA

MAY 5 1944

LIBRARY



81st
Annual Session
Chicago
August 22-24
1944



THE QUEST



For Security and Independence Is Less Difficult Where Domestic Animals Are Abundant and Healthy

When man advanced from agriculture to industry and emerged into the age of science and technology he could not abandon the science and art of animal husbandry, for therein lay much of the "raw material" of human progress.

The quest is practical not grandiose. It refers to one of the chief objectives of agriculture and veterinary science—to the effort to furnish a generous supply of animal proteins which nutritionists agree is the background of healthier and more aggressive people than those who live mainly on a vegetable diet.

THE QUEST IS FOR LOWERED MORTALITY AND HIGHER HEALTH RATE AMONG FARM ANIMALS THROUGH RESEARCH AND EDUCATION, AND WELL-REGULATED APPLICATION OF VETERINARY KNOWLEDGE IN THE FIELD, TOGETHER WITH RELIABLE PRODUCTION LABORATORIES AND THEIR FAITH IN THE VETERINARY PROFESSION.



HOME OFFICES AND BIOLOGICAL LABORATORIES, OMAHA, NEBR.



SERUM PLANT, RALSTON, NEBR.

SERUM PLANT, 44TH ST. AND U ST., OMAHA, NEBR.



The Corn States Serum Co.
Omaha, Nebraska



Journal of the American Veterinary Medical Association

Copyright 1944 by American Veterinary Medical Association
600 S. Michigan Ave., Chicago 5, Ill.

VOL. CIV

MAY 1944

NO. 806

The Transmission of Glanders from Horse to Man

C. D. McGILVRAY, M.D.V., D.V.S.

Guelph, Ontario

GLANDERS as a disease of the horse appears to have been recognized and referred to by Hippocrates about the year 425 B. C. From that time, the disease has been constantly referred to in veterinary literature. During the eighteenth century, two conflicting views became evident as to its origin. One group expressed and supported the view that the disease was of contagious origin, while the other group held the opposite view. Finally Viborg, a Danish veterinarian, published a treatise on glanders during the year 1797 in which he definitely referred to a specific cause being present in the purulent nasal discharge and the secretions from pustules and ulcers in the skin. Viborg's description of the disease at that early date shows that his observations and assumptions were well-founded and finally corroborated by the discovery and identification of the *Bacillus mallei* (*Pfeifferella mallei*) during the year 1822 by Loeffler and Schütz in Germany, and by Bouchard and Capitan in France. Following this, two Russian veterinarians, Helman and Kilning, produced from cultures of the bacillus, the product called mallein which was found to have the quality of causing a reaction when injected into glandered horses, thus introducing the mallein test for detecting latent cases of the disease. The discovery of the mallein test prepared the way for the final control and eradication of the disease.

Glanders in the horse usually follows a chronic course with a variable period of

incubation extending from several weeks to several months. As a result, it is customary to speak of two types of glanders, namely: (a) clinical and (b) latent or non-clinical glanders.

Clinical cases are recognized by definite symptoms commonly known as the *cardinal signs of glanders* which consist of: (1) a chronic nasal discharge with or without ulceration of the nasal septum; (2) enlargement and induration of the submaxillary lymph glands; and (3) the presence of pustules and ulcers (farcy buds) on the skin of the legs and other parts of the body.

Latent or nonclinical cases are essentially pulmonary in type, whereby the disease remains in a concealed state in the lungs in the form of tubercle-like nodules. In many of these cases, the affected horse may show slight signs of chronic lung trouble (altered breathing) and is capable of spreading the infection by the respiratory secretions for a period of several months before showing recognizable clinical symptoms. These cases are actually more numerous than clinical cases and can only be positively detected by the mallein test.

SUSCEPTIBILITY

Glanders is essentially a disease affecting horses, mules, and donkeys. Cattle, sheep, and swine are virtually immune. Human beings are quite susceptible and usually become infected by inoculation from the nasal discharges of a diseased horse, by making a postmortem examination, examining diseased specimens, or

Presented at the annual meeting of the Canadian Health Association, Toronto, Dec. 15, 1943. The author is principal of the Ontario Veterinary College.

while handling laboratory cultures of the bacillus.

OCCURRENCE AND DISTRIBUTION

Glanders was widely prevalent as a disease among horses in Canada until the year 1915. Since then, the disease has been suppressed and at the present time, is entirely eradicated. The disease still prevails to a considerable extent in some parts of Europe, Asia, and Africa. The prevalence and distribution of glanders has always greatly increased during and following all the great wars in different parts of the world, and this may be repeated in the present world conflict.

CAUSE AND TRANSMISSION

Glanders is caused by the *Pfeifferella mallei* (*Bacillus mallei*). The bacillus is present in the nasal discharges and suppurative discharges from the pustules and ulcers (farcy buds) which develop especially on the skin of the legs. Generally speaking, glanders is spread through the ordinary channels of horse traffic. The infection is usually introduced to the premises through the medium of both clinical and nonclinical cases. Natural infection may take place by either of the following channels:

1) *By Ingestion into the Digestive Tract.*

—This is regarded as the most common channel of infection through the nasal discharges contaminating the feed or water.

2) *By Inoculation Through the Skin.*

—This may take place through abrasions of the skin or mucous membrane by contamination with the nasal discharges or pustular secretions.

3) *By Inhalation into Respiratory Tract.*

—While this is possible, it is not considered the common or usual channel of infection.

POSTMORTEM APPEARANCES

Cases of glanders can be diagnosed by means of the mallein test and a postmortem examination is not always necessary or even desirable except by a skilled person using proper precautions. This is owing to the extreme danger of infection while making an autopsy under field conditions. The postmortem appearances depend on the nature of the case and comprise either of the following gross lesions.

Skin Lesions.—Clinical cases are characterized by skin lesions consisting of nod-

ules, pustules, and ulcers on the skin, especially of the hind leg below the hock and on the inner thigh.

Respiratory Lesions.—Nodules and ulcers may be present on the surface of the respiratory mucous membrane, especially on the nasal septum, turbinate bones, larynx, and trachea.

Pulmonary Lesions.—In the majority of cases, the lungs are the seat of disease, consisting of tubercle-like nodules embedded in the lungs. When incised the nodules show a necrotic yellowish centre containing pus. Frequently there are definite glandular pneumonic areas in the lung with suppurating foci discharging into the bronchial tubes.

Lymphatic Lesions.—The lymph glands adjacent to and draining the glanders foci are invariably swollen and indurated. The submaxillary lymph gland is frequently found to be enlarged and indurated and while it seldom forms an abscess, nevertheless, it may, on cross section, be found to contain a small amount of caseous pus-like material. The bronchial and inguinal glands may be similarly affected.

Other Lesions.—Lesions may be found occasionally in some of the other organs of the body, namely, the liver, spleen, and kidney.

DIFFERENTIAL DIAGNOSIS

Glanders may be differentiated from such diseases as are characterized clinically by nasal discharge and ulceration of the legs, namely:

Caries Teeth with Pus in the Facial Sinuses.—In these cases the nasal discharge is quite profuse, more so than in glanders, and has an offensive odor. The nasal discharge in glanders has very little odor. The mallein test can be applied where the diagnosis is doubtful.

Strangles.—This is essentially an acute febrile respiratory disease of young horses characterized by profuse nasal discharge from both nostrils, and by the sudden development of an acute diffuse painful suppurative swelling in the intermaxillary space. This is a benign affection following a definite course, inclining towards recovery in a few weeks time.

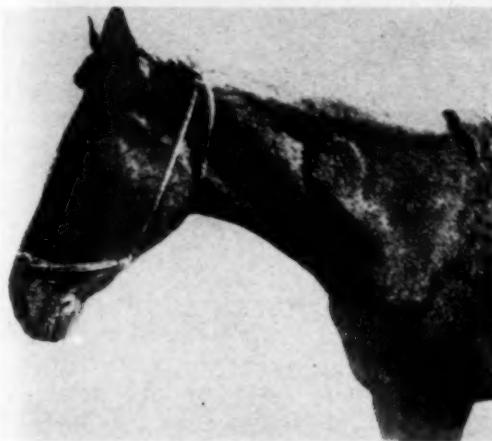
Purpura hemorrhagica.—This disease may be clinically distinguished from glanders by the presence of petechiae on the nasal mucous membrane and conjunctivae together with the characteristic edematous swellings on the body and legs.

Lymphangitis.—All forms of lymphangitis accompanied by ulceration of the legs

should be differentiated from glanders by means of the mallein test.

THE POSITIVE DIAGNOSIS OF GLANDERS

While glanders may be diagnosed in some cases by the presence of clinical symptoms, the use of the mallein test is necessary for the detection of latent infection and as an aid in the diagnosis of doubtful or suspected cases. There are



—After Hutyra and Marek

Fig. 1—The local reaction following an injection of mallein subcutaneously in the neck of a horse affected with glanders. The so-called thermic or subcutaneous mallein test.

three recognized methods of applying the mallein test, known respectively as:

The Subcutaneous Mallein Test.—In the application of this test, 2.5 cc. of dilute mallein is injected subcutaneously on the flat surface of the neck. Temperatures are taken before and after the injection of the mallein. This test produces in the glandered horse a definite thermal reaction and a distinct painful reactionary swelling at the point of injection, in from eight to twelve hours.

The Ophthalmic Mallein Test.—In the application of this test, the mallein either in liquid or tablet form is placed in the fornix of the eye. A positive reaction to this test is manifested by the development of a purulent conjunctivitis in the treated eye in from six to twelve hours.

The Palpebral Intradermic Mallein Test.—In the application of this test, the mallein is injected intradermically into the loose fold of skin below the margin of the lower eyelid. A positive reaction to this test is manifested by marked swelling of the eyelid accompanied by a pronounced mucopuru-

lent secretion from the eye, lasting several days. The reaction becomes manifest in from twenty-four to forty-eight hours.

CONTROL AND ERADICATION

The treatment of glanders in the horse is not permitted in Canada. This disease is scheduled under the Contagious Diseases of Animals Act requiring compulsory notification and immediate slaughter of affected horses based on the application of the mallein test. All reactors to the test must be immediately slaughtered and their carcasses properly buried or cremated, followed by the satisfactory cleaning and disinfection of the stables and yards occupied



—After Hutyra and Marek

Fig. 2—Mucopurulent reaction following the instillation of fluid mallein or mallein pellet into the conjunctival sac of a horse affected with glanders. So-called ophthalmic mallein test.

by the affected animals. Contact horses on the same premises which do not react to the initial test are held under quarantine pending a retest in two or three weeks. Any additional reactors discovered on the retest are likewise required to be slaughtered. Other contact or exposed horses must be traced up and tested to prevent new outbreaks. Under this policy of compulsory notification, test, and slaughter, glanders has been completely controlled and eradicated in Canada, Great Britain, and the United States. On the other hand, in some

parts of Europe, Asia, and Africa, where the disease has not been so dealt with, it still prevails to a considerable extent, and during and following the present war an increase in the prevalence of glanders is likely.

The comprehensive suppression and eradication of glanders was undertaken in



—Photo by the author

Fig. 3—Reactionary edema of the eyelids, profuse lacrimation, and purulent conjunctivitis following an intradermal injection of mallein into one of the lower eyelids of a glandered horse. The so-called intra-palpebral mallein test.

Manitoba during the month of February, 1905. The disease appeared to be on the increase in that province and by an arrangement entered into between the Government of Manitoba and the Dominion Government, it was decided to adopt radical measures under the regulations relating to glanders, requiring compulsory notification and slaughter of reactors to the mallein test.

GLANDERS STATISTICS IN MANITOBA 1901 TO 1916

From 1901 to 1904, only clinical cases were dealt with and the mallein test was not used to detect latent cases.

1901, 60 horses were destroyed.

1902, 50 horses were destroyed.

1903, 40 horses were destroyed.

1904, 160 horses were destroyed.

During the year 1905, compulsory notification and slaughter of reactors to the mallein test was instituted. This policy required the slaughter of both clinical and nonclinical cases. The result was:

YEAR	HORSES TESTED	REACTORS DESTROYED	COMPENSATION PAID
1905	1,777	871	\$ 60,053.27
1906	1,403	336	27,207.37
1907	3,065	199	17,303.11
1908	1,319	124	9,304.91
1909	813	70	5,391.27
1910	380	19	1,536.66
1911	930	38	3,389.98
1912	993	24	2,030.00
1913	247	20	1,780.00
1914	733	45	5,313.33
1915	177	4	443.33
1916	37	Nil	Nil
Totals	11,874	1,750	\$133,753.23

Note—In addition to the horses shown above, 22,481 horses and mules entering from the United States were mallein tested.

In subsequent years, only a few individual or sporadic cases were detected in horses entering Manitoba, so that the disease was practically eradicated in 1916.

The suppression and eradication of glanders in the horse has been responsible for its disappearance in man.

GLANDERS IN MAN

While glanders as a disease of the horse appears to have been definitely recognized and comprehensively referred to from a very early period (by Hippocrates about the year 425 B. C.), no definite recognition of it as a disease transmissible from horse to man is positively recorded until the early part of the last century. This is known as the Travers' case reported in 1830 and relates to a veterinary student who became infected while dissecting a glandered donkey in London. From that time cases of glanders in man began to attract more attention, and many cases have since been recorded in medical and veterinary literature.

William Hunting, F.R.C.V.S., chief veterinary inspector to the London County Council, published in 1908 a clinical treatise on glanders. Hunting's monograph is without doubt a classic on the subject of glanders in the horse, and he also includes an appendix relating to glanders in man, describing 10 cases which he knew of, occurring between 1903 and 1905.

The most comprehensive analysis made

regarding cases of glanders in man is recorded in that exhaustive monograph on the subject published in May, 1906, by G. D. Robins, M.D., of the Royal Victoria Hospital, Montreal. In his treatise, "A Study of Chronic Glanders in Man," Robins makes



—After Hunting

Fig. 4—A typical case of cutaneous glanders (farcy) affecting a hind leg.

an analysis of 156 cases collected from the literature available at that time, and during the following year, 1907, he describes 10 cases occurring in Canada. Of these cases, 2 were personally diagnosed and reported by myself in Manitoba. One case was observed during 1905 and the other during 1906. These 2 cases are the ones I now wish to describe from personal observation.

FRASER CASE, SELKIRK, MANITOBA

This case came under observation during August, 1905. Fraser was 22 years of age and was employed at office work in Winnipeg. During the middle of August, he went on a short visit to his grandparents, residing on a farm near Selkirk. While there, he helped with the farm work and was assigned a team of horses to work and look after. One of the team was a grey

mare which had recently been obtained from a horse dealer. This mare had a nasal discharge and Fraser on August 20 made an examination of the mare to determine the cause of the discharge. He, no doubt, became infected in so doing. Two days later, he began to complain of illness, and thereafter the course and progress of the disease could be definitely traced.

Period of Incubation.—This was of two days duration as Fraser unquestionably became infected on August 20, and on August 22, he complained of feeling sick (vomiting).



—Photo by the author

Fig. 5—The pustular manifestation on the arms of a human case of generalized glanders.

Prodromal Period.—This began on August 22, when he first complained of illness and on the following day, his appetite became definitely impaired and during the next three days, he commenced to complain of pains involving the loins and hips, nausea also increasing.

Period of Pronounced Illness.—This began on August 26, on which date the patient became suddenly worse. He now refused all food and complained of severe pain in the joints of his arms and legs. His joints became acutely inflamed and

swollen, indicating involvement of the articulations and synovial membranes. On this date, a physician was sent for (Dr. Ross of Selkirk). He diagnosed the case as probable typhoid as there were no definite symptoms characteristic of glanders present at that time.



—Photo by the author

Fig. 6.—A case of human glanders in the advanced stage, showing extensive pustulation of the face and arms.

Period of Nodular Eruptions.—On September 3, or fourteen days after the time of infection, the first clinical objective symptom appeared as a large nodule or pimple on the forehead which was extremely painful to the touch. Two days later (September 5), nodules were rapidly increasing in numbers and size and appeared simultaneously on the chest, arms, and legs. The pain and swelling of the joints also became more acute. At this time, I found glanders among the horses belonging to the dealer that sold the grey mare. On locating this mare on Fraser's premises, I found her to be a clinical case of glanders and she reacted to the mallein test. Hearing of the young man's illness and seeing him, I suggested the possibility of him having contracted glanders and suggested a medical consultation. Dr. Grain of Selkirk was called in consultation by Dr. Ross, and a diagnosis of glanders was then made. Some of the pus material was subsequently submitted for laboratory examination to the late Dr. Gordon Bell, provincial bacteriologist, and he confirmed the clinical diagnosis.

Pustular Period and Ulcerative Stage.—On September 6, the nodules were developing into pustules and ulcers. The nostrils became ulcerated and discharged a bloody, purulent material. Ulcers also appeared on the eyelids and lips. The patient then sank rapidly and succumbed to the disease on September 8, literally covered with pustules and ulcers.

Comment.—The period of incubation was definitely established as two days; the disease became manifest at first by nausea and typhoid-like symptoms, lasting from ten to twelve days, followed by a period of nodular and pustular eruption, nasal ulceration, and discharge covering a period of five days. The course and duration of the disease covered a period of nineteen days from the time of infection.

HALL CASE, DARLINGFORD, MANITOBA

This case came under observation May 12, 1906. Hall, a farmer, had been treating his own horses for several weeks for a nasal discharge which he supposed to be distemper. He began to feel sick on May 5, but continued to attend to his farm work until May 8, when he began to complain of severe pain in the joints and muscles of his arms and legs. His physician, Dr. J. D. Stewart, of Darlingford, was called in, and from the symptoms, naturally thought the patient to be suffering from an attack of inflammatory rheumatism. On May 12, I happened to be in that district tracing up some suspected cases of glanders, and incidentally visited Hall's premises to examine his horses. I found several of them to be showing definite clinical symptoms of glanders and confirmed the diagnosis by the mallein test. On visiting the house to inform the owner regarding his horses, I found him in bed suffering from severe pains in the axilla and in his joints, particularly the knees and hips. I noticed that his face showed marked icterus, with dark-colored areas under the eyelids. He also had a painful nodule on the forehead and a painful, swollen, tense, shiny area of cellulitis about the size of one's hand on the calf of the right leg and a similar area of inflammation on the upper part of the left arm. Believing the case to be likely glanders, I immediately got in touch with Dr. Stewart and reported my suspicions to him. At his request, I visited the patient with

him. We found the patient to be restless and feverish with a temperature of 103.6 F., and pulse 100. On the following day, the patient's condition was only slightly changed, and he remained in much the same condition until May 16. On that day, the patient's temperature was higher, the pulse irregular. The area of cellulitis on the leg and arm had increased in size. The nodule on the forehead had developed into a pustule; an ulcer had also developed on the face, another one on the left shoulder and one on the left thigh. Dr. Stewart then definitely confirmed the diagnosis of glanders infection and called the district health officer, Dr. Speechly of Pilot Mound, in consultation. From the facts of the case, he agreed with the diagnosis and submitted material for laboratory diagnosis to Dr. Gorden Bell, provincial bacteriologist. His findings confirmed the clinical diagnosis. On May 17, the patient had become much worse; he was in severe agony from pains in his joints and muscles and greatly depressed. At this time, numerous small lesions had developed on the shoulders, back, and thighs. The lesions showed all stages of development from reddened nodules to pustules and ulcers. On May 19, the patient became literally covered with suppurating sores. He died the following day.

Comment.—The exact period of incubation could not be established. The disease at the onset was characterized by general illness and manifestations of inflammatory rheumatism. This was followed by areas of cellulitis on the arms and legs, marked icterus of the face, and, subsequently during the later stages, by the rapid development of nodules, pustules, and ulcers over the surface of the body. The duration and course of the disease covered a period of approximately fifteen days.

Ruminant Nutrition

The ruminant presents intriguing problems to the physiologists and bacteriologists. In the young, the true stomach compared with the capacity of the other three compartments, is relatively large. As the rumen, reticulum and omasum enlarge to receive bulky forage, the reverse is true in the adult. Only the true stomach (abomasum) secretes gastric juice. The frag-

mentation that takes place in the other three compartments is brought about by microorganisms that take residence therein. There is little evidence that the large amount of saliva swallowed exerts any enzymatic action. The chemical changes (fermentation) feed-stuff undergoes in the rumen are important factors in ruminant nutrition. Goss, University of California, raised calves to 19 months without roughages by feeding concentrates frequently in small quantities and adding cod liver oil and calcium carbonate. The feeding of artificial roughage (paper pulp) did not alter rumination.

Ruminants possess the power to synthesize vitamins. Thiamin, riboflavin, biotin, pantothenic acid, vitamin K, and to some extent nicotinic acid increase in the rumen during the fermentation of feedstuffs. The microorganisms in the rumen are also able to use nonprotein nitrogenous compounds such as urea and ammonium salts for the synthesis of protein (protoplasm) which can be utilized eventually by the ruminant. Although ascorbic acid is known to be synthesized by ruminants, obviously its sources are the tissues. The rumen, through the action of bacteria, is able to extract about 30 per cent of energy available in roughages.—(*Peculiarities of Ruminant Nutrition*, Nutrition Reviews, 1, (Nov. 1943): 389-390.)

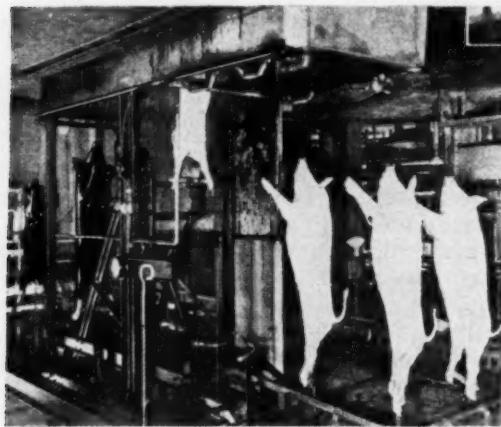
The Local Associations

The solidarity of organized veterinary medicine in the United States seems to be the natural fusion of local and state associations operating jointly under unwritten by-laws to govern the relationship. The local associations with their dinner sessions, to confess the truth as seen from the sidelines, are stealing the show and more power to them. The voluntary concordat is the strongest of human ties—stronger than constitutions and by-laws and mandates. It's freedom running on high—like the town meetings of the colonials.

Up to the present, scientific studies of our civilization have doted on climatic, racial, and social influences to the almost complete exclusion of man's major problem—nutrition.

Abattoir Depilation of Hogs

STRANGE AS it may appear, the little paragraph headlined "Chemical Depilation of Hog Carcasses" on page 227 of the April JOURNAL aroused enough interest to justify additional information. Among packers,



—From Allbright-Nell Co. Catalog

Fig. 1—Hog carcasses entering and leaving the vat containing the adhesive compound. Rate: 50 to 700 hogs per hour.

the removal of bristles and hair from slaughtered hogs may not seem as new as the article implied; yet, in going deeper into the subject, we find that one of the first articles on the subject was written by H. K. Gillman of the Tobin Packing Co., Inc., of Fort Dodge, and read before the thirty-second annual meeting of the Institute of Meat Packers in Chicago, Oct. 23, 1937. A copy of this address was furnished to us by Ralph Vermilya, chief veterinarian of Wilson & Company, Chicago, together with additional information on the details of the process.

In short, in the large packing plants, scalding and scraping off the hair of hogs by hand or scraping machinery belongs to the past. Instead, hogs after being hoisted to the rail and bled are dipped mechanically into "a hot adhesive compound" which forms a complete seal-like coating over the whole body. The heat turns the cutaneous moisture into steam which penetrates to the very roots of the hair and loosens them forthwith. When the carcass is lifted out and cooled, and the compound is removed, the result is a completely "dehaired" hog, ready to swing down the line for the usual

steps of hog slaughtering in meat-packing plants. A rubber band around the nostrils or cotton stuffed into them keeps the compound from entering the nasal passages.

Figure 1 shows the carcasses entering and leaving the depilator, and figure 2 illustrates an operator in the act of stripping off the compound.

A revealing sidelight on the process is the fact that while Gillman of the Tobin



—From Allbright-Nell Co. Catalog

Fig. 2—Operator beginning to strip off the adhesive, and partly stripped carcasses.

Packing Company seems to be entitled to "literary priority" on the process, A. O. Lundell (C.V.C. '06), an engineer for the Allbright-Nell Co., of Chicago, was an important figure in designing the necessary equipment. As to whether the process is new or old, we note that the National Provisioner, 53-year-old magazine of the meat-packing industry, runs a leading article on the details of the process in its July 3, 1943, issue, less than a year ago. It was first used by the Tobin Packing Company, about 1932, and by the larger packing

houses in Chicago after the middle of the 1930 decade. So far as we know, the process was never before mentioned in veterinary literature.

This discussion would be incomplete without mention of the care that is now being taken to collect hog bristles for use in the manufacture of brushes: paint and



—From Allbright-Nell Co. Catalog

Fig. 3—Operator picking bristles by hand for the brush makers. Only bristles 2 3/4 inches long are useful.

varnish, wool combing, and shaving brushes, and other vital equipment for military use. These were formerly made from hair imported from Russia and China. Hog bristles are not permitted to be destroyed by the chemical depilation process. They are picked off by hand, as shown in figure 3, and sorted as to length, from all hogs having sufficiently long bristles to make the operation worth while. The collection of bristles in this fashion was urged by the War Production Board and the packers provide the means of complying in the interest of the war effort.

[The part played by L. V. Hardy, inspector-in-charge of meat inspection, Newark, N. J., in developing chemical depilation of hogs, will be announced in the June issue.
—Editor.]

Russian Veterinary Science

After the war, Russia will be a tremendous customer and a powerful competitor. Today, she has 180,000,000 united people who have energy and willingness to work. Her government is the largest commercial concern in the world. Her citizens inhabit one seventh of the earth's surface. . . Political courtship may be fleeting, but business is unsentimental and durable.—*From Nation's Business*.

Because of the potentiality of her livestock production and the amazing development of Russian science, the USSR is destined to replace the western European countries in the leadership of veterinary medicine. She seems to have what it takes in acreage, resources, hardy population, and original research in the biological sciences.

California Wants Veterinary Livestock and Meat Inspectors

The State Personnel Board of California has announced continuous "duration" civil service examinations for veterinary livestock inspectors and veterinary meat inspectors. Entrance requirement for the former is possession of a valid license to practice veterinary medicine in California; for the latter, graduate with a doctor's degree in veterinary medicine from an institution of recognized standing. California residence is not required but applicants must be either United States citizens, nationals of nations allied with the United States, or nationals of nations with which the United States is at peace.

Until further notice, applications will be accepted at any time from qualified applicants and must be made on special forms which may be obtained from the State Personnel Board, 1015 L Street, Sacramento; 108 State Building, San Francisco; or 401 State Building, Los Angeles.

Although the percentage of horses and mules to persons in the United States has declined with the ascendancy of motor power, the ratio is still 1 : 10. In other words, there is one horse or mule to serve every denary of the total population, horseless as we are said to be.

Swine Erysipelas

CHARLES G. GREY, D.V.M.
Washington, D. C.

IN THE East we think of swine erysipelas as a disease which, in the United States, is generally associated with the hog-raising areas of the Middlewest. There, in the densest swine population of the world, we find a widespread incidence of erysipelas in a so-called mild form and relatively small, shifting areas of acute outbreaks. In this section, the disease has made its appearance from time to time, and we have reports of isolated cases having occurred in most of the States of the eastern area.

Theobald Smith first isolated the causative organism of swine erysipelas in the United States in 1885. Between then and 1894, the organism was encountered three times in the bodies of swine. In 1894, Minnesota was the scene of "much disease among swine." Dr. Smith isolated the erysipelas organism from tissue specimens of a pig that had succumbed to this outbreak of swine disease, identified it as such, and wrote an excellent description of it in the Report of the Bureau of Animal Industry for the fiscal years 1895 and 1896.

In 1921, Dr. Creech of the Bureau of Animal Industry isolated the organism from a case of diamond skin disease. However, we did not feel particularly alarmed about the situation, and it was not until Dr. Fosterman of South Dakota told us that swine erysipelas existed in his territory in an acute, septicemic form and was causing heavy losses among a large number of swine that we finally realized we were facing a problem which might prove in time to be as serious as hog cholera. By 1933, a survey indicated the presence of the disease in 17 states. Since that time, a number of states have been added to the list.

From surveys made by veterinarians in private practice, by others engaged in commercial work or in the employ of the various states, and by those in the Bureau of Animal Industry of the U. S. Department of Agriculture, we may accept the fact that

wherever hogs are raised, we are likely to find the swine erysipelas organism. However, this does not mean that the disease is a serious menace in all sections of the country. We have not found it to be so, but there is always the threat that it will later prove to be a menace. In some parts of the so-called "corn-hog-belt," swine erysipelas has become a problem of increasing importance during the last ten years, and now bids fair to run hog cholera a close race in economic consequence to the swine industry of that section.

The specific cause of swine erysipelas is the erysipelas bacillus, *Erysipelothrix rhusiopathiae*, a slender, slightly curved, small rod 1.0 to 1.5 μ in length, which may in acute cases be readily isolated from the spleen, kidneys, affected joints, and bone marrow. It is quite as readily isolated from affected joints and lesions (when present) on the heart valves of chronic cases. The organism is nonmotile, does not form spores, stains quite readily with aniline dyes, and is gram-positive. A waxy coat protects it from dessication and is probably responsible for its resistance to putrefaction and to the effects of pickling, smoking, or drying in meats over long periods of time. *E. rhusiopathiae* is primarily an organism of the soil and in this its natural habitat, is capable of growing to considerable depth, where it multiplies rather than merely maintaining itself in a dormant stage. It is not destroyed by freezing. In the laboratory erysipelas-infected tissues and broth cultures of swine erysipelas were frozen at -70° C. for periods of months. Upon thawing out, they were capable of cultivation or of causing the disease upon inoculation into susceptible animals. The sun's rays, which are effective upon direct exposure, fail to penetrate to a sufficient depth in soil to bring about destruction of the organisms of swine erysipelas. Ordinary disinfectants, when brought into direct contact with the organism, are quite effective in destroying it; it is also destroyed by moderate heating.

Swine of all ages are susceptible to swine erysipelas. The causative organism has

Presented at the meeting of the Veterinary Medical Association of New Jersey, Feb. 3-4, 1944.

From the Pathological Division, Bureau of Animal Industry, Agricultural Research Administration, U. S. Department of Agriculture, Washington, D. C.

been found to affect horses, cattle, sheep, dogs, ducks, chickens, turkeys, mud hens, parrots, and man. Pigeons and mice, our usual laboratory test animals for this disease, as a rule succumb to inoculations with this organism within two to four days. However, if cultures are maintained on artificial mediums for some time there is a gradual lessening of virulence until, with some strains, it is impossible to bring about the death of these animals with inoculations of such organisms. It is difficult to produce acute erysipelas in swine by artificial exposure or inoculation. However, this has been done in several instances. In one case, an organism was isolated from various tissues of an acute case, identified as such, inoculated into susceptible swine, and produced both acute and chronic cases of the disease.

There appears to be some relationship to the soil between this organism and the production of erysipelas in swine. It has been shown that contact of normal swine with erysipelas-infected swine on clean concrete floors failed to bring about transmission of the disease. However, when clean soil was thrown onto the floor and the experiment repeated, transmission of the disease from the affected swine to the controls was successful.

In Europe, there are so-called swine erysipelas districts where this disease occurs as a perennial problem. It now appears that similar areas are developing in the swine belt of this country. The soil in such areas is probably rich in nitrates and other elements necessary for the well being of this organism, and once infected swine have been brought onto such soil and have deposited the organisms with their eliminations, the organisms are there permanently. It may be that the swine bringing infection to the place are apparently normal in every respect, yet, on their tonsils, or on the ileocecal valves, or elsewhere on the various mucosae, they may be carrying this organism. It may be years before organisms eliminated by such animals reach the right state in the soil, thus infected, to cause the disease to make its appearance in swine quartered on that soil. However, there is thus produced an affected area.

Swine erysipelas has been spoken of as a seasonal disease, making its appearance in the spring, late summer, or fall months. In

this country where we have pigs farrowed during every month of the year, we have swine erysipelas making its appearance during any of the seasons.

Acute swine erysipelas is characterized by its sudden onset; many swine in the herd may be affected at the same time. Only a few may be visibly sick but a number of others may run temperatures of 105 to 110 F. Affected hogs lie in their bedding, but it may be noted that their eyes are clear and active—every move one makes is watched, but they move reluctantly unless forcibly disturbed, when they start off with considerable activity put protest with loud squeals as though in great pain. Affected swine are touchy when they walk. In the effort to keep their feet well under them, they exhibit an arched topline. The joints are tender, and after moving about a bit the swine soon drop into their bedding again. Edematous swellings may be seen on the lower portions of the legs of some of the swine. Such swellings do not necessarily involve the joints and may disappear on cessation of the symptoms. The swellings are not to be confused with those in which the joints are involved. Where considerable swelling at the joint is noted, there is usually a destruction of articular surfaces, proliferation of synovial fringes, and perhaps exostoses which do not disappear when the disease subsides. These result in the so-called "knotty-legged hogs" (chronics) which harbor the organisms in the affected joints and may act as spreaders of the disease.

Several of the hogs may die suddenly. They may appear well at feeding time one evening and be found dead the next morning. There have been cases where entire herds have died but this is rather rare, at present in this country, although not so uncommon in unvaccinated herds in swine-erysipelas districts of Europe. As a rule only a few die, others make complete recovery, while the rest may remain unthrifty, chronic cases.

In hogs acutely ill, a shortness of breath, caused by pulmonary edema, may be noted. At times, edematous swellings about the snout make breathing difficult. A not uncommon symptom is nausea and vomiting. As the disease progresses, twenty-four to forty-eight hours following the onset, there may be noted on the lighter portions of the skin irregular red patches which are

neither tender to the touch nor swollen. These areas may remain localized or they may enlarge, becoming confluent until the greater part of the body surface is involved. I have seen cases in the field in which a hand placed on either side would move the skin as one great wooden piece, from jowl to tail head. We once produced an acute case experimentally in which regular, rhomboidal, or so-called diamond skin lesions appeared, and the hog died within three days following inoculation. *E. rhusiopathiae* was isolated from the skin lesions. Such lesions on the skin, however, are usually associated with a more benign type of swine erysipelas in which the symptoms are of a milder character. Affected swine may exhibit the symptoms discussed under the acute form of the disease, but usually the symptoms, as has been indicated, are milder and rapidly subside after the appearance of the characteristic skin eruption. Unless complications set in, animals affected with this type of swine erysipelas usually recover within two weeks. However, where the diamond-skin lesions extend over a considerable area of the skin, there may be a resultant dry-gangrenous sloughing of great portions of skin. Ears and tails are often lost in such a fashion, although loss of tails is more frequently observed and at times may be the only evidence of infection, past or present, with the swine erysipelas organism. It may be further noted that skin lesions are difficult to see on other than the lighter-colored breeds of hogs or on the light portions of the dark breeds.

Swine that do not die often remain unprofitable to the owner. Many are left with arthritis—these animals are discounted by the packer-buyers. Others may not show enlarged joints, but may appear dehydrated; their heads, ears, and legs develop normally but their bodies waste away, giving them an appearance commonly referred to by their owners as race-horse pigs. Such hogs eat a lot but fail to finish out as soon as they should or as well as might be expected. Joint involvement may appear as an independent manifestation. All joints may be involved but those of knee, hock, and toes are most frequently observed.

At times, the only indication of infection in the herd is a dry, scaly eczema, non-parasitic in character, and which fails to clear up with changes of feed, or following

the use of prescribed dips and oils. Such lesions clear up as a rule upon the administration of specific antiserum alone or in combination with living culture.

The eyes of swine sick with erysipelas are usually clear and active, although there may be a slight watery discharge. There may be present edematous swellings about the eyes, as well as elsewhere over the bodies of infected swine. Ears may be quite swollen and legs may present a stocking effect.

As the knife passes along through the skin preparatory to opening an affected hog for postmortem examination, it may be noticed that inflammatory discoloration is not limited to the skin alone but extends in varying depths into the fat underlying the discolored areas.

A postmortem examination of the internal organs may reveal some or all of the lesions as indicated in the following. However, bear in mind that it is difficult to make a definite diagnosis of swine erysipelas from lesions alone. Laboratory examination of tissues should be made on suspected cases until sufficient familiarity with the disease is attained to qualify one to make a diagnosis based on case histories, clinical manifestations, and postmortem examinations.

The tonsils, in acute cases, may be normal or present a cherry red to bluish-red disoloration; the lymph nodes enlarged, edematous, and exhibit cherry red or bluish-red congestion. The heart presents ecchymoses in and under the endocardium, diffuse congestion of the fat at the base of the ventricles, and valvular endocarditis, (cauliflower growth on heart valves). The lungs may be swollen, edematous, and congested, and the liver enlarged and engorged with blood; the spleen moderately enlarged throughout or only in spots, and dark red or brownish-red.

The mucous membrane of the stomach, particularly of the fundus and pylorus, is swollen and cherry red to intensely bluish-red and shows ecchymoses. The submucosa is edematous, and frequently there are areas partly covered by a tenacious mucus. Superficial, dry, necrotic patches may be found. A few years ago, considerable importance was attached to the diagnostic value of so-called paint brush hemorrhages on the serous surface of the stomach, but in recent years, we have found that this

condition is associated also with other diseases.

The small intestine, particularly, is involved and occasionally the large intestine. The mucosa is hyperemic and swollen and may show ecchymoses and shallow erosions.

The kidneys are dark in color, enlarged, soft, and moist upon incision. Punctiform or diffuse hemorrhagic infiltration may be observed. The urinary bladder may exhibit hemorrhages and contain a highly colored urine. The bone marrow is abnormally red, soft, and friable.

The various joints may reveal inflammation of the synovial membranes—reddish, flaky, synovial fluid, formation of granulation tissue and connective tissue proliferation, giving rise to the formation of elongated tags or threads (synovial fringes) either attached to the synovial membrane or freely suspended in the joint fluid. Capsular ligaments become thickened and the articular cartilages eroded. As the damage progresses, periostitis and osteitis with ankylosis occur.

It must be borne in mind that other diseases may be present in herds at the same time and in the same animals affected with swine erysipelas. Caution must be observed before rendering a positive diagnosis. There is always a possibility that hog cholera is present. With this in mind, the following points may be of assistance in determining the presence of hog cholera:

In swine erysipelas, the onset is more sudden and abrupt and the course more rapid. Body temperatures are generally higher than in hog cholera. A history of lameness with recovery or death of a hog sometime prior to the outbreak indicates swine erysipelas. During the course of the outbreak, there are usually cases exhibiting stiffness and stilted gaits.

In swine erysipelas, there is more pain evidenced on handling than in hog cholera. The eyes remain clear and active while in hog cholera they are dull and gummy. The lymph nodes in hog cholera assume a more markedly dark red discoloration with a tendency toward enhancement of the color at the periphery, while in swine erysipelas there is rather a characteristic cherry red to violet discoloration.

The spleens of uncomplicated hog-cholera cases remain normal in size while those of swine erysipelas have localized or generalized enlargements.

In hog cholera, intestinal lesions are more commonly found in the large intestine, while in swine erysipelas they are more commonly observed in the small intestine.

There is no known drug or combination of drugs of value in the treatment of swine erysipelas.

Most veterinarians are familiar with the use of serum alone in the treatment of this disease. It may be well to mention, however, that passive immunity obtained by the injection of serum alone persists for only two weeks to thirty days and may not be depended upon after that time. In fact, dependence should not extend past two weeks. During the early stages of the disease, anti-serum, if injected in liberal quantities, usually brings about prompt recovery. However, if the disease has been present for some time, the chance of obtaining favorable results is doubtful.

The use of serum alone has not proved satisfactory in the control of swine erysipelas in badly infected areas of the Middlewest. Repeated breaks occurred in herds where the serum had been employed. Favorable results followed the immediate use of the serum, but these were only temporary. Within thirty to sixty days, a second break occurred in the same herds, even in the same animals which had received serum. The serum has but a retarding effect, and when the effects of the serum vanish the infection reasserts itself.

Early in the spring of 1938, in response to pleas of swine breeders and veterinarians in Nebraska that an attempt be made to immunize hogs in that region against swine erysipelas, a project was instituted whereby the United States Bureau of Animal Industry, in coöperation with the Nebraska Bureau of Animal Industry and Dr. Van Es at the College of Agriculture, University of Nebraska, would furnish cultures to certain practicing veterinarians in the area for the purpose of simultaneous vaccination of hogs with serum and culture in order to establish an active immunity.

Similar work had been done in Europe for forty years, with good results. However, because of the nature of the disease, we could not be sure that this method of immunization would be suitable under our conditions. Only a controlled experiment could clarify this. Such an experiment was set up in Nebraska and has gradually been

extended to include most of the swine-raising states where incidence is high.

So far, it appears that the vaccination is doing a lot of good. The results are not 100 per cent perfect by any means. It appears that by serovaccination of pigs during the first week or ten days of life, we are assured of at least three months' protection against natural infection. In most cases, the immunity produced is considerably longer. However, bear in mind that this method of immunization is suited only to those areas known to be infected with swine erysipelas organisms; in those areas, the disease is so well established in the soil that bringing in live-culture erysipelas vaccine does not constitute a potential menace from the standpoint of seeding down that soil for future outbreaks of the disease.

CONCLUSION

It may be well to give a brief outline of possible control measures:

1) Discourage the purchase of diseased swine of any description.

2) Follow the so-called "McLean County System" of sanitation with accent on the use of scrub brush, elbow grease, and lye. Although the swine sanitation system as practiced may not eliminate swine erysipelas organisms from the soil, yet, if by virtue of the system the hogs are kept reasonably free of parasites and filth-borne infection, they will be more resistant to swine erysipelas.

3) Confine sick swine and remove unaffected swine to clean ground or new quarters. Take temperatures of all the swine and administer serum to those having any rise in temperature. Repeat in twenty-four hours, administering a second dose of serum to those which during that time have failed to return to normal.

4) Dispose of manure and other waste from infected swine in such a way that hogs will not come in contact with it later.

5) Burn hogs dead of this disease.

Around pens and equipment there is probably no better disinfectant for the purpose of eliminating this disease than common household lye. A 1 to 150 dilution is recommended. According to Dr. Ernest C. McCulloch, lye solutions, in this concentration, are not markedly caustic to the skin and are not dangerous to livestock if they should accidentally drink moderate amounts.

Such a solution is effective in loosening the dried discharges and manure and leaving surfaces clean as well as disinfected.

American Foundation of Animal Health

Those who follow the work of the various agencies engaged in arousing interest in the importance of reducing the losses suffered by farmers from animal diseases do not overlook the practical methods of the AFAH which was founded several years ago by the Associated Serum Producers, Inc., with the declared purpose of building up better relations between the veterinary service and the livestock industry. None know better than the "serum industry" that the cost of death losses and subnormal health is too high in view of present day knowledge of veterinary medicine; and that industry founded an organization to tell the farmers the simple story of animal diseases as they effect them and all mankind. Elsewhere in this issue are four pictures showing one of the methods pursued in arousing interest in animal medicine and hygiene.

Foot-and-Mouth Disease: They Hide It

In Europe, the trouble is that some farmers do not report the disease (f- and m-) and this makes it extremely difficult to stamp out. When veterinarians serve notice that every herd in a district is going to be inspected, farmers hasten to report herds that are already recovering. In 1922-1923, when foot-and-mouth disease raged in highly virulent form, farmers who had lost some cows tried to get indemnity for outbreaks they had never reported. It is highly probable that when the 1914 outbreak spread through 22 states in this country, some farmers did not report their cases.—*Chas. Haasjes, Shelby, Michigan.*

Preventive medicine has majored almost exclusively in the handling of microbial life, whereas nutritional defaults should not have been so completely ignored as definite and often specific etiological factors. Inadequate proteins, mineral deficiencies, avitaminoses as forerunners of microbial infections, lack of growth and gains, and poor performance ought to be in the front rank of preventive veterinary medicine.

LET'S KEEP THEM UNDER CONTROL —SABOTEURS OF WAR FOOD PRODUCTION



STEPPING STONES TO OUR FOOD GOALS



LIVESTOCK HEALTH ODDITIES



THE WEAK LINK IN THE CHAIN



—American Foundation for Animal Health

Four out of many pictorial suggestions to the American farmer on the importance of veterinary science, sponsored by the American Foundation of Animal Health in its educational campaign in the agricultural press.

The Practical Application of Anthelmintic Medication of Lambs

J. W. BRITTON, D.V.S., and R. F. MILLER, M.S.

Davis, California

THE REQUISITES of the ideal anthelmintic are nontoxicity, ease of administration, low cost, and effectiveness. The first three are easy to evaluate, but the effectiveness of routine anthelmintic medication, especially where it is used for preventive purposes, is often difficult to analyze. To the livestock man, the criterion of effectiveness is whether or not the treated animals show more profitable gains than animals which remain untreated or are treated with other drugs. The helminthologist is more interested in the reduction in egg count of the feces or in the number of parasites remaining in the gastrointestinal tract of the host following treatment. Because of the importance of parasitism in sheep, the therapeutics of parasitic gastroenteritis in lambs has received a great deal of attention from veterinarians and lamb producers alike.

The copper sulfate and nicotine sulfate mixture (cunic mixture*), tetrachlorethylene, and phenothiazine are the three anthelmintics most commonly employed in combating parasitism in lambs and all three have been strongly advocated. The first two drugs named must be given as individual treatment after a twelve to eighteen hour preliminary starvation period, but phenothiazine can be administered as a pellet, drench, or mixed with feed or salt. It is the purpose of this paper to compare the effectiveness of these three anthelmintics in the control of parasitism of lambs on irrigated Ladino clover pastures.

EXPERIMENTAL

All of the experimental lambs were from one band of sheep and had been raised and handled alike. They had been on a 1 to 15 phenothiazine and salt mixture from the time they were born until June 6, 1943. On June 19, 1943, 438 of these lambs were divided into 8 groups by branding them 1, 2, 3, 4, 5, 6, 7, and 8 in succession as they came through a long chute. The groups were then separated, weighed, treated, and representative fecal samples taken from 5 lambs in each group. The first 6 lots

From the Division of Veterinary Science, University of California, Davis.

*A popular name for copper-nicotine mixture.
—Ed.

were then turned onto one irrigated Ladino clover pasture and lots 7 and 8 were mixed with other lambs on two identical pastures. The lots were treated as follows: lot 1—controls, no treatment; lot 2—3 oz. of cunic mixture; lot 3—5 cc. tetrachlorethylene; lot 4—8 Gm. of phenothiazine powder in hard gelatin capsule; lot 5—15 Gm. of phenothiazine as a drench (commercial preparation); lot 6—13.5 Gm. phenothiazine pellet (commercial preparation); lot 7—continual free access to a 1 to 15 mixture of phenothiazine and ground salt; lot 8—continual free access to a 1 to 10 mixture of phenothiazine and ground salt. Lot 7 consumed approximately 1 oz. of phenothiazine per head and lot 8 approximately 2 oz. per head during the two month experimental period.

On July 22, lots 2 to 6 inclusive were given a second treatment and five representative fecal samples from each lot were taken. On August 20, all lots were again weighed, the fat lambs sorted out, fecal samples taken, and the number of dead lambs in each lot figured. The fecal samples were all examined by Stoll's dilution technique.

Table 1 shows the comparative weight gain, egg count, fat lambs, and deaths in each lot. All lots were weighed in the same order at the start and finish of the experiment, hence any weigh shrinkage would be approximately the same for each lot. The death losses were for the most part unaccounted for because of advanced postmortem decomposition.

DISCUSSION

The results obtained offer a means of determining the degree of perfection of the anthelmintics in question by applying an analysis of the four requisites of the ideal anthelmintic. With the exception of the lot treated with tetrachlorethylene, none of the lambs showed toxic effects from the treatments. Several of the lambs treated with tetrachlorethylene crushed the capsules in their mouths and showed immediate symptoms of depression, dizziness, in coördination and coma. However, the toxicity of both cunic mixture and tetrachlorethylene is well known and every year many lambs are killed by the administration of overdoses, or too strong solutions of these drugs. On the other hand, it was early established by Taylor⁸ in the preliminary work on phenothiazine that sheep are the most tolerant of all domestic animals to

whatever toxic effects this drug may possess. It has been repeatedly demonstrated that there is a wide margin of safety between the toxic and therapeutic doses of phenothiazine for sheep. Wright¹⁰ has shown that repeated doses of 30 Gm. given every week for six weeks have no ill effects on lambs, nor do they produce any change in the blood picture. Thorp and Keith,⁹ and Britton, Miller, and Cameron³ have reported on the nontoxicity of phenothiazine salt mixtures for lambs even when fed for long periods of time. Evidently, phenothiazine must be considered the least toxic of the three anthelmintics under consideration.

on each lot of 55 lambs every time the individually treated sheep were dosed. On the other hand, one man, in the course of his routine duties as irrigator and herder, without significant loss of time, was able to maintain the salt mixtures fresh in the troughs. Obviously, labor, handling of the lambs, and loss of feeding time are at a minimum when the salt mix methods are used.

The effectiveness of the treatments, whether based on egg counts, weight gain, percentage of fat lambs, death loss or profit to the feeder, significantly favor the 1 to 10 phenothiazine salt mixture lot. Cunic mixture and all forms of phenothia-

TABLE I—Comparison of the Anthelmintic Efficiency of Cunic Mixture, Tetrachlorethylene and Phenothiazine

LOT TREATMENT	No.	6-19-43		8-20-43		AVG. GAIN	FAT	DEAD
		Avg. wt.	EPG*	Avg. wt.	EPG*			
1 control	55	62.5	100	80.4	1000	17.9	13	1
2 cunic	55	61.1	150	79.8	300	18.7	17	2
3 tetrachlorethylene	55	60.8	100	77.7	600	16.9	14	3
4 8 Gm. pheno. powder.....	55	61.3	200	78.5	300	17.2	23	0
5 15 Gm. pheno. drench.....	55	62.3	200	81.4	100	19.1	30	1
6 13.5 Gm. pheno. pellet.....	54	60.3	150	81.1	100	20.8	34	2
7 1-15 pheno. salt	54	58.8	150	78.2	0	19.4	41	0
8 1-10 pheno. salt	54	57.9	100	83.7	0	25.8	42	0

*EPG = worm eggs per gram of feces.

There can be little doubt but that the phenothiazine salt mixtures are the easiest of the anthelmintics to administer. The other forms of phenothiazine, and the other two drugs all require individual handling of the lambs, which is a major item when from 3,000 to 10,000 lambs are to be treated. Because of the bulky nature of phenothiazine, it is the most difficult to administer when individual treatment is required. On the other hand, phenothiazine does have the advantage of not requiring a preliminary starvation period of twelve to eighteen hours, such as is essential to obtain the best results with either cunic or tetrachlorethylene.

If the actual cost of the drugs alone is to be considered, phenothiazine pellets are the most expensive and the cunic mixture the cheapest. However, one should consider the labor involved, handling of the lambs, and loss in feeding time in the starvation period before treatment with cunic or tetrachlorethylene. These factors are almost impossible to evaluate in determining the cost, but are, nevertheless, important factors. It required, on the average, three men working for thirty minutes

zine, except the 8 Gm. in capsule form, gave definitely better results than the controls, whereas the lambs treated with tetrachlorethylene made the poorest showing in all respects. Inasmuch as all of these lambs had been on 1 to 15 phenothiazine and salt mixtures since they were born, the conditions were not quite comparable with those normally present on irrigated Ladino clover pastures. Lots 7 and 8 were in with more typical feeder lambs carrying a moderate parasite burden. Hence, these lots were exposed to a greater risk of parasitic infection than the first 6 lots.

Gordon⁴ has pointed out that 12 per cent of lambs repeatedly fail to respond to the cunic mixture because of failure of the esophageal reflex to operate in time to direct the mixture into the abomasum. This factor hardly had time to operate in the experiment. It is conceivable that had the trial been continued over a longer period of time, or had the experimental lambs been more heavily parasitized at the start, the results would have shown more significant differences between some of the lots. It is believed, however, that the trend shown in the recorded results is approxi-

mately correct, and that phenothiazine is definitely a superior anthelmintic to cunic or tetrachlorethylene.

The results rather closely parallel those of Thorp and Keith⁹ who found that heavily parasitized lambs treated every three weeks responded most satisfactorily, as judged by egg counts alone, to a 1 to 9 mixture of phenothiazine and salt and least satisfactorily to tetrachlorethylene with cunic, and that phenothiazine powder in capsules held the middle ground. Likewise, Briggs and Smith³ found that tetrachloroethylene was unsatisfactory in removing stomach worms from lambs, and that all forms of phenothiazine removed a larger percentage of parasites than cunic mixture, as judged by careful postmortem examination. In their work, there was no significant difference in the weight gains of the groups after two weeks of treatment with cunic or the various forms of phenothiazine. All groups, however, gained considerably more than the controls. Stewart and Crofton,⁷ McEwen,⁶ Gordon, Montgomery, and Whitten,⁵ and Boddie, Corner, Morgan, and Sloan¹ have shown in a series of well controlled experiments that lambs treated with phenothiazine make better gains and have fewer parasites than similar lambs run on the same pastures, but treated with cunic mixture.

The higher percentage of fat lambs in the last 4 lots is a significant finding, although difficult to evaluate in the determination of anthelmintic efficiency. The aim of the feeder on irrigated clover pastures is to produce fat lambs as rapidly as possible in order to feed the largest number of lambs during the relatively short season. The fact that the 2 lots on the salt mixtures never had to be moved, starved, or handled, as well as the efficiency of this method as a preventive, probably accounts for the greater percentage of fat lambs in these 2 groups.

There appears to be little doubt that 1 part of phenothiazine mixed with 10 parts of half ground salt, kept in front of lambs at all times, most nearly approaches the ideal anthelmintic of any of the drugs or methods employed in this trial. It is non-toxic, easy to administer, cheap, and the most effective when judged by any known method of measuring anthelmintic effectiveness. Other forms of phenothiazine, except 8 Gm. of phenothiazine powder, are more satisfactory than either cunic mix-

ture or tetrachlorethylene. The pure phenothiazine powder in therapeutic doses (12 to 15 Gm.) would undoubtedly give equally as satisfactory results as the drench or pellet forms of the drug.

The drugs used in this experiment were furnished through the courtesy of the Dow Chemical Company, The California Wool Growers Association, and Drs. Hess and Clark.

References

- ¹Boddie, G. F., Corner, H. H., Morgan, D. O., and Sloan, J. E. N.: Field Trials with Phenothiazine on Lambs. *Vet. Rec.*, 53, (1941): 171.
- ²Briggs, H. M., and Smith, H. C.: Phenothiazine for the Control of Stomach Worms in Sheep. Oklahoma Exper. Sta. Bul. 263, 1943.
- ³Britton, J. W., Miller, R. F., and Cameron, H. S.: The Control of Parasitism in Sheep with Phenothiazine in a Salt Lick. *Cor. Vet.*, 32, (1942): 400.
- ⁴Gordon, H. McL., and Whitten, L. K.: A Note on Variations in the Efficiency of the Copper Sulfate and Nicotine Sulfate Drench Against Haemonchus Contortus. *Australian Vet. J.*, 17, (1941): 172.
- ⁵Gordon, H. McL., Montgomery, I. W., and Whitten, L. K.: Treatment of Outbreaks of Haemonchosis. *J. Counc. Sci. and Indust. Res.*, 15, (1942): 200.
- ⁶McEwen, A. D.: Comparative Tests on the Treatment of Lambs with Phenothiazine and with Copper Sulfate and Nicotine Sulfate. *Vet. Rec.*, 52, (1940): 657.
- ⁷Stewart, W. L., and Crofton, H. D.: Parasitic Gastritis in Sheep: Comparative Trials on Lambs with Phenothiazine and Copper-Nicotine Sulfate Mixture. *Vet. Rec.*, 53, (1941): 167.
- ⁸Taylor, E. L.: Phenothiazine—A Remarkably Efficient Anthelmintic. *Vet. Rec.*, 52, (1940): 635.
- ⁹Thorp, W. T. S., and Keith, T. B.: The Use of Phenothiazine for Sheep Compared with Other Anthelmintics. *Vet. Med.*, 38, (1943): 215.
- ¹⁰Wright, W.: A Note on the Effect of Repeated Doses of Phenothiazine on Sheep. *Vet. Med.*, 37, (1942): 33.

Atabrine Approved

"Thanks to God," says Brig. Gen. James S. Simmons of the Medical Corps, "we have developed atabrine production in this country so that we can supply the world." General Simmons regards atabrine to be as good as quinine in the treatment of malaria.

Malaria, diarrhea and dysentery, and venereal diseases are the big medical problems of the Army the General declared after a tour of the various theaters of operation. Typhus is not among the big four because louse control has conquered it.

Insecticides

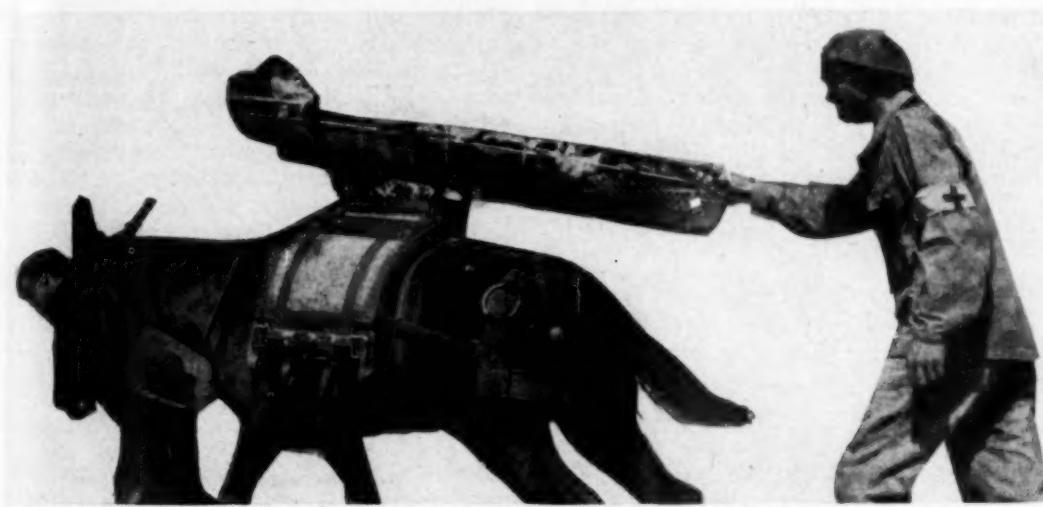
Insecticides used in the form of lotions, ointments, and aerosol sprays must take the place of impractical methods of insect extermination in the moving theaters of military operation. The discovery of potent ones by the Medical Corps is a credit belonging to World War II.

The Missouri Mule and the Wounded Soldier

The following* was written in 1936, during the interwar period when little attention was paid to such details of military operations:

The Medical Corps charged with the evacuation of the wounded should give careful

evacuation which will fill the gap that exists between the point of injury and the nearest motor ambulance station. Those casualties reaching the point where motor ambulances are available have at least an even chance. . . . We have available in the United States



—U. S. Signal Corps

"Army Mules Carry Wounded in New Guinea" was among the recent releases of the U. S. Army Signal Corps, operating on the South Pacific front. You've heard of airplanes evacuating the wounded to the base hospitals, but not of the mules that bring them from the jungles to the airfield. As long as there are wars, there will be army mules.

thought to the possible use of animals at the front. Those who saw service in the combat area in the last war still have hopes that satisfactory methods will be devised for the evacuation of the wounded from advanced points. Considerable improvement must be made in the facilities thus far made available if their hopes are to be realized. It is unfortunate that motorization has become so foremost in the minds of many that the possibilities that exist in animal transport have been overlooked, if not relegated to the discard. Some experimental work with animal-drawn vehicles and ambulances has recently been done but, judging from the reports, no real progress has been made in this particular field. It is believed that the four-wheeled, animal-drawn ambulance is obsolete and has outlived its usefulness in any terrain and that efforts should be made to develop a method of

an animal of unusual adaptability and stamina, the Missouri mule.

Inasmuch as the essential details of military operations against enemy resistance is but drifting deadwood to the general population in times of peace, such prophetic analyses of the needs of actual combat pass unnoticed until the next upheaval arrives. Keeping military knowledge alive among the civilian population in peacetime falls to small groups, who maintain such organizations as the Association of Military Surgeons, and who are ready to form at least a skeleton of their respective services when the next war breaks out. The picture reproduced herewith is proof that battlefield experiences make wise teachers.

Plants grow and reproduce without the aid of human hands. But, man is not that independent. To survive, he has to pilfer what the sun puts into plants.

*Excerpt from a paper read at the 44th annual convention of the Association of Military Surgeons of the United States, Detroit, Mich., Oct. 29-31, 1936, by Lt. Col. Orville E. McKim, Vet. Res., A. U. S. Reprinted from *The Military Surgeon*, December, 1936.

Sulfasuxidine and Sulfathalidine for Infectious Calf Scours

W. T. S. THORP, D.V.M., M.S., V. J. PISCIOTTA, M.S., and
CORA B. GRUNDY, B.S.

State College, Pennsylvania

THE USE of the sulfonamides as a chemotherapeutic agent for intestinal infections of man and animals has received considerable attention for the past several years. This report is the result of a two-year study to determine the value of sulfasuxidine (succinyl sulfathiazole) and sulfathalidine (phthalylsulfathiazole) in the treatment of infectious calf scours.

Sulfanilamide derivatives have been used in human medicine for various enteric in-

the blood and tissues, which are equally dependent upon the amount of drug excreted in the urine in a soluble form. When sulfonamides precipitate in the kidneys, tissue damage occurs; both sulfasuxidine and sulfathalidine appear to be readily eliminated in the urine.

There are several reports appearing in veterinary literature on the use of the sulfonamides for enteric diseases of domestic animals. In 1941, Cameron and McOmie³

TABLE I—A Comparison of the Average Concentrations of Sulfonamide in the Blood, Urine, and Feces of Normal Calves After Administering Various Doses of Sulfasuxidine and Sulfathalidine

CALF No.	WT. LB.	KG. OF BODY WT.	G.M. PER DAY PER NO. DAYS	SULFONAMIDE											
				BLOOD			URINE				FECES				
				T. Mg. %	F. Mg. %	C. Mg. %	T. Mg. %	F. Mg. %	C. Mg. %	T. Mg. %	F. Mg. %	C. Mg. %	SULFASUXIDINE	SULFATHALIDINE	
2	208	0.5	5	0.76	0.52	0.02	52.22	14.1	32.52	3713.0	105.0	266.72			
3	205	1.0	5	1.0	0.033	0.52	115.4	20.4	86.98	1536.0	87.0	1415.0			
4	204	0.5	5	0.28	0.15	0.14	45.5	9.8	32.06	536.6	45.6	475.9			
5	183	0.5	5	0.22	0.12	0.04	54.6	9.8	28.6	599.6	64.5	532.0			
6	180	1.0	4	0.53	0.18	0.23	103.8	16.0	81.8	1522.2	73.2	1438.7			
7	257	0.5	4	0.03	0.08	0.12	31.5	5.6	23.7	938.4	51.3	867.0			
SULFATHALIDINE															
9	96	1.1	4	1.2	0.7	0.05	99.3	45.3	25.1	2292.8	1368.0	0			
10	123	0.25	3	0.4	0.3	0.00	24.8	14.7	0.5	1765.9	1076.7	0			
11	73	0.5	4	0.5	0.3	0.00	31.8	18.7	0.4	2361.4	1455.0	0			
12	110	1.1	4	0.8	0.5	0.05	62.8	45.3	13.5	2179.3	1322.8	0			

T. Mg. = total milligrams; F. Mg. = free milligrams; C. Mg. = combined milligrams.

fections and to reduce the number of coliform bacteria in the gastrointestinal tract, preceding surgical treatment of certain diseases. A report by Poth *et al.*¹ and Poth and Knott² demonstrated the value of sulfasuxidine for reducing the coliform bacteria in the gastrointestinal tract of dog and man. In these experimental studies, it was demonstrated that sulfasuxidine is not readily absorbed from the gastrointestinal tract resulting in high concentrations in

reported studies on the toxicity and blood concentrations of sulfaguanidine in sheep and swine. Kernkamp and Roepke⁴ reported extensively on the use of sulfaguanidine for enteric diseases in swine, indicating very favorable results. The use of sulfaguanidine for calf scours was reported by Thorp and Shigley⁵ in which 40 calves were treated successfully with this drug. In a recent report by Bryan,⁶ sulfasuxidine has been indicated as a treatment for enteric infections in the dog. Herriott⁷ reports the successful use of sulfasuxidine as a preventive and treatment for infectious calf scours.

MATERIALS AND METHODS

Two series of experiments have been completed on normal calves and on those showing

Authorized for publication on October 20, 1943, as paper No. 1200 in the Journal series of the Pennsylvania Agricultural Experiment Station, from the Dept. of Animal Husbandry (Animal Pathology Lab.) and the Dept. of Agricultural and Biological Chemistry.

This work was supported in part by a Research Grant from Sharp and Dohme, Inc., Glenolden, Pa.

clinical symptoms of calf scours. Six normal calves were used for toxicity studies on sulfasuxidine and four for studies on sulfathalidine. All calves in these experimental groups were given the sulfonamides by mouth, as a drench. The daily dosage was divided into 3 equal doses and given morning, noon, and night. Blood, urine, and fecal samples were obtained, daily, in the forenoon, which was usually four to five hours after the morning dose of the sulfonamides. Chemical determinations were started soon after the samples were collected. The quantitative determination of the drug in the blood, urine, and feces followed the method of Bratton and Marshall.⁸ The determination of the "free" sulfonamide made in the usual manner is subtracted from the total to obtain the figures for sulfathiazole in the conjugated form. The latter figures, multiplied by the factor 1.39, expresses the combined form as succinylsulfathiazole. The factor 1.58 is used for phthalylsulfathiazole. During the three-day control period, nonprotein nitrogen and urea nitrogen determinations were made upon the blood. The 24-hour output of the urine and its specific gravity were recorded as well as the weight of the feces.

The sulfonamides were administered to the calves immediately after the collection of the last samples of blood, urine, and feces on the final day of the control period. The determinations for the sulfonamides were started on

the next samples and were continued until the drug level was practically insignificant in the blood, urine, and feces. Samples of feces for chemical and bacteriological analysis were taken per rectum during the control period and after administration of the drug. These were chilled immediately and determinations were made within one to two hours. The method described by Poth *et al.*,¹ using desoxycholate agar, was used for determining the effect of the drug on the coliform bacteria in the gastrointestinal tract. Veal infusion broth agar was used for the total aerobic counts. Blood determinations were made on a number of clinical cases of infectious calf scours.

TOXICITY AND CLINICAL STUDIES

Four main objectives were kept in mind during the study: (1) to find the lowest therapeutically effective level of the sulfonamides for use in clinical cases of infectious calf scours and the effect of this dosage on normal calves when doubled; (2) to determine the concentration of the drug in the blood of both normal and scouring calves as influenced by dosage; (3) to determine the effect of the sulfonamides on the coliform bacteria of the gastrointestinal tract of the calf; (4) to determine the presence or absence of histopatho-

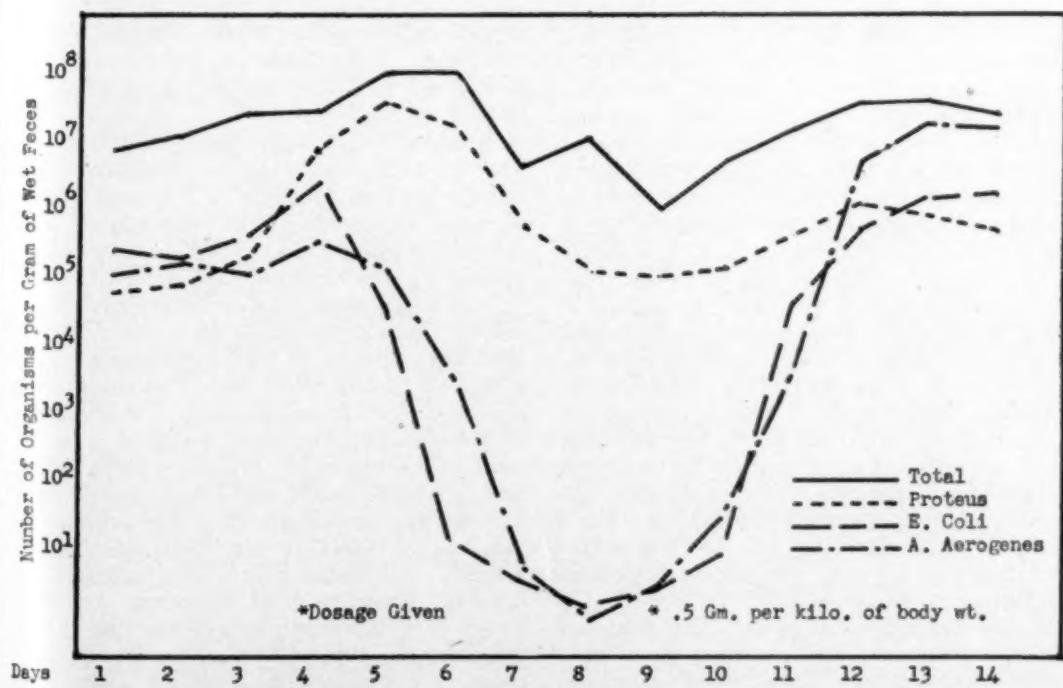


Chart I.—The antibacterial activity of sulfathalidine in the gastrointestinal tract of the calf.

logical changes in the liver, intestine, and kidneys.

The comparative blood, urine, and fecal concentrations for sulfasuxidine and sulfathalidine, when these drugs were fed to normal calves at various levels, are shown in table 1. There was very little rise in the blood level of these sulfonamides when the dosage was increased, although there appeared to be somewhat more absorption of sulfathalidine than of sulfasuxidine. This might be explained by the difference in size and age of the calves used. The variation in dosage for the experimental calves was reflected more by the drug level

a dose of 0.4 Gm. per kilogram of body weight. The lowest dosage rate was 0.4 Gm. and the highest was 0.7 Gm. per kilogram of body weight. Four of the 45 calves did not respond to the treatment and died from infectious calf scours. Blood determinations were made on 10 of the calves. The concentration of the drug in the blood, the nonprotein nitrogen, and urea nitrogen values are shown in table 2. A control sample of blood was drawn just prior to administering the sulfasuxidine. All of the 10 calves made a good recovery.

Sixteen calves with clinical symptoms of infectious calf scours were treated with

TABLE 2—The Average Values for the Blood of Ten Calves with Clinical Symptoms of Infectious Calf Scours Given a Four-Day Treatment of Sulfasuxidine

CALF NO.	WT. LB.	GM. PER KG.	N.P.N.* MG. %	UREA N. MG. %	TOTAL MG. %	SULFASUXIDINE		
						FREE† MG. %	COMBINED MG. %	% COMBINED
3140	65	0.4	20.8	11.1	0.33	0.17	0.09	28.1
3141	105	0.4	32.9	11.6	0.41	0.15	0.19	36.9
3150	65	0.6	31.3	10.1	0.44	0.33	0.20	32.7
3151	92	0.5	28.9	10.9	0.39	0.19	0.17	57.5
3152	90	0.5	30.5	9.2	0.31	0.19	0.25	53.5
3156	80	0.6	34.1	10.3	0.70	0.21	0.40	46.9
3157	70	0.4	36.4	11.0	0.68	0.11	0.50	56.3
3153	57	0.6	34.5	10.2	1.80	1.50	0.27	13.2
3155	65	0.4	29.1	8.6	0.50	0.19	0.28	32.8
3163	61	0.5	32.3	9.0	0.45	0.14	0.25	45.7

*N.P.N. = Nonprotein nitrogen.

†Free drug is shown in terms of sulfathiazole and the remainder as succinyl sulfathiazole or "Sulfasuxidine."

in the urine than in the blood, indicating that the small portion of these sulfonamides which was absorbed was readily eliminated by the kidneys. This was true, particularly in calves 3, 6, 9, and 12 as can be seen in table 1. No toxic manifestations were observed in any of the experimental calves which were given sulfasuxidine or sulfathalidine. Charts 1 and 2 indicate that these two drugs possess excellent bacteriostatic activity and low toxicity. It will be noted in comparing charts 1 and 2 that the action of sulfathalidine does not appear to be as prolonged as that of sulfasuxidine, however, it causes a greater reduction in the coliform count. Calves which received these drugs in amounts sufficient to produce a marked lowering of the coliform organisms showed an average blood level of 0.32 mg. per 100 cc. for sulfasuxidine and 0.4 mg. per 100 cc. for sulfathalidine.

Forty-five calves showing clinical symptoms of infectious calf scours were treated with sulfasuxidine. These calves averaged 85 lb. in weight and received on the average

sulfathalidine and all except 1 made a good recovery. They received on the average a dose of 0.23 Gm. per kilogram of body weight.

A comparative study was made on the use of sulfasuxidine and sulfathalidine, using various dosages. To avoid any seasonal difference in the severity of the infectious scours, the dosages were alternated as cases occurred, until a group of 6 or more had been treated differently. Nine calves which averaged 80 lb. in weight with clinical symptoms of calf scours were given a three-day treatment of sulfathalidine at the rate of 0.21 Gm. per day, per kilogram of body weight. Another group of 8 calves which averaged 72 lb. in weight with clinical symptoms of calf scours were given a three-day treatment of sulfasuxidine at the rate of 0.44 Gm. per kilogram of body weight. All of the calves in this group of 8 except 1 made a good recovery. Another group of 6 calves which averaged 68 lb. in weight with typical symptoms of the disease were given a dose of 0.11 Gm. per kilogram of body weight. All of these

calves made a recovery; however, 2 of the calves did not have as severe symptoms of the disease as is usually encountered. In 2 out of 4 calves showing the most severe symptoms, the recovery was a little slower than when a higher dosage of the drug was given. The other 2 cases of severe scours given the low dosage made a good recovery.

DISCUSSION

A study has been made on the toxicity and therapeutic value of two sulfanilamide derivatives used for the treatment of infectious calf scours, namely sulfasuxidine and sulfathalidine. In these two sulfonamides, the primary amino group has been condensed with a carboxyl group to form a substituted acid amide, thereby altering the absorbability from the gastrointestinal tract. The use of these two sulfonamides as intestinal antiseptics has given excellent results. Beneficial results have been obtained by the administration of these drugs to calves with clinical symptoms of infectious calf scours. Indications are that a great part of this beneficial effect is due to the altering of the bacterial flora of the gastrointestinal tract, either by inhibiting their growth, or by interfering with their normal metabolic processes. It has been

conclusively shown that high blood concentrations of these sulfonamides are not readily obtained. That which is absorbed from the therapeutic oral dose is readily excreted by the kidneys and therefore the toxicity of the drug is relatively low. This has been confirmed by blood chemistry, blood counts, and a histopathological study of the intestine, liver, spleen and kidneys. As long as toxic manifestations from the administration of these drugs is not encountered, their use should be extended.

SUMMARY

Sulfasuxidine and sulfathalidine have been used on cases of infectious calf scours. These sulfonamides were found to be highly bacteriostatic for the coliform bacteria. The sulfathalidine was apparently more bacteriostatic than the sulfasuxidine when given in equal dosages.

Toxicity studies were made upon ten normal calves to determine the concentration of the drugs in the blood, urine, and feces. Two to four times the therapeutic dose of the sulfonamides was administered without evidence of toxicity. A histopathological study of the liver, spleen, and kidneys showed no tissue changes.

On the basis of the work with normal

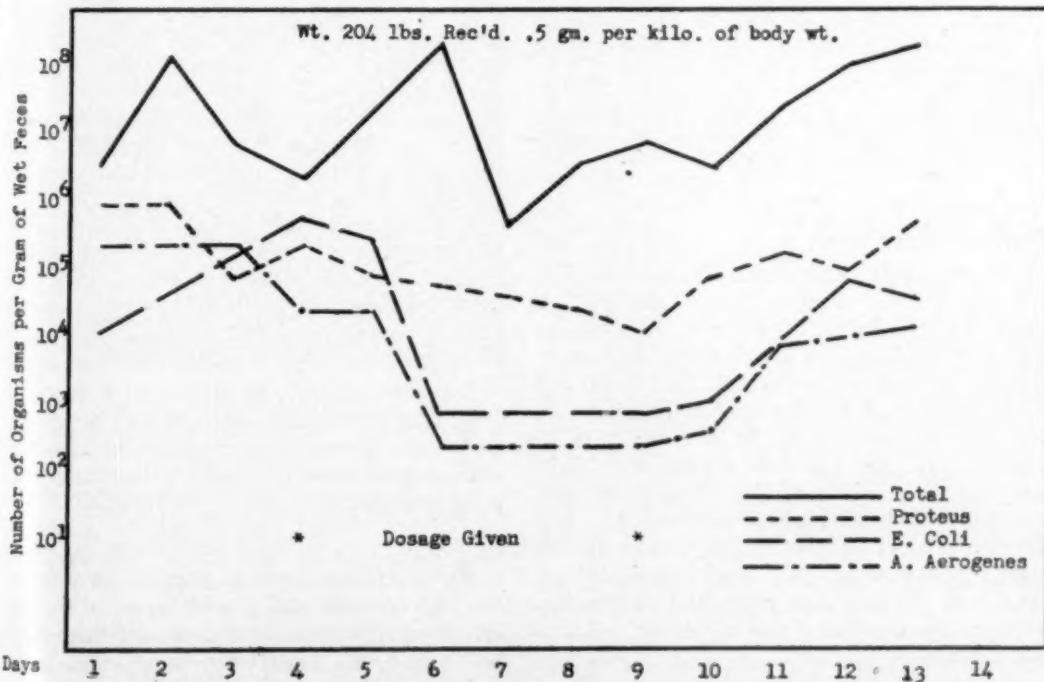


Chart 2—The antibacterial activity of sulfasuxidine in the gastrointestinal tract of the calf.

calves and 84 calves showing clinical symptoms of infectious calf scours, the following dosages are recommended: Sulfasuxidine should be given at the rate of 0.5 Gm., sulfathalidine at 0.25 Gm. per kilogram of body weight. Smaller calves with infectious scours of average severity have responded well to dosages of sulfathalidine at the rate of 0.1 Gm. per kilogram of body weight.

ACKNOWLEDGMENTS

The authors wish to express their appreciation to Dr. J. F. Shigley and Dr. A. K. Anderson for their helpful suggestions and assistance, and to the Department of Dairy Husbandry for its coöperation in furnishing the experimental calves.

References

- ¹Poth, E. J., et al.: Bacteriostatic Properties of Sulfanilamide and Some of Its Derivatives. *Arch. Surg.*, 41, (1942) : 187-207.
- ²Poth, E. J., and Knott, F. L.: Clinical Use of Succinylsulfathiazole. *Arch. Surg.*, 41, (1942) : 207-222.
- ³Cameron, H. S., and McOmie, W. A.: Blood Concentration Studies on Sulfanilylguanidine in Swine and Sheep. *Cornell Vet.*, 31, (1941) : 321-330.
- ⁴Kernkamp, H. C. H., and Roeke, M. H.: Sulfaguanidine in the Treatment of Infectious Enteritis in Swine. *Am. J. Vet. Res.*, 4, (1943) : 3-14.
- ⁵Thorp, W. T. S., and Shigley, J. F.: Sulfaguanidine Therapy for Calf Scours. *Vet. Med.*, 37, (1942) : 210-213.
- ⁶Bryan, A. H.: "Sulfasuxidine" succinylsulfathiazole in Veterinary Practice. *J. A. V. M. A.*, 102, (1943) : 22-25.
- ⁷Herriott, H. W.: Prevention and Treatment of Infectious Calf Scours with "Sulfasuxidine" Succinylsulfathiazole. *J. A. V. M. A.*, 102, (1943) : 261-263.
- ⁸Bratton, C. A., and Marshall, E. K., Jr.: A New Coupling Component for Sulfanilamide Determination. *J. Biol. Chem.*, 128, (1939) : 537-550.

Postwar Pestilence

Quoting British statistics, 11 million European cattle, 3 million horses, 12 million hogs, and 11 million sheep represents the shortage of livestock in Europe. Milk production has been reduced 33 per cent and meat 50 per cent. Translated in terms of the protein the human body must have to remain healthy, the figures are alarming. According to Dietz of the *Scripps-Howard Service*,* they spell pestilence, hunger, and famine which, in the lengthy wars of the past, contributed to final capitulation. Quoting: "It may also play the determining rôle in the coming siege of Hitler's European fortress."

*Supplied by J. L. Arendez, Como, Miss.

What these predictions mean is that pestilence under the circumstances pointed out first removes the animal population and not only starts but still further intensifies the human misery feared. As applied to the present situation in the United States, veterinarians will agree that entirely too little stress is placed upon the fight they are making against farm-animal plagues. What is coming to pass among the meat- and milk-producing animals of Europe can also happen here, with even more staggering effect than the wisest prophets have yet predicted.

Germs and Ticks Disillusion Congress—More Than Investigation Needed

It now appears that all of the millions appropriated and spent on tick eradication, stamping out foot-and-mouth disease, bovine-tuberculosis control, hog-cholera supervision, and the work pursued in battling the corn borer, boll weevil, Mexican fruit flies, browntail moths, grasshoppers, and many other pests of agriculture, horticulture, and animal production were illegally acquired. In creating the Department of Agriculture back in the 1880's, Congress did not authorize itself to appropriate funds for sanitary police work. It authorized itself to appropriate money only for investigation. Not a penny was granted for eradication of the plagues investigated, obviously in the hope that if these little pests were given a thorough scolding they'd take the hint and quit behaving like the cannibals they are.

The House of Representatives the other day passed a bill making its past actions in this connection legal—*ex post facto*; the Senate has yet to confirm the action.

An average hen, of but 4 to 5 lb., lays 190 eggs weighing six times her body weight in a year, and in doing so she consumes a volume of feed forty times her body weight.

Primitive man was as much a parasite as the screwworm and grasshopper. He lived off plant life and produced nothing; later he began to farm the land and raise animals. Now, only the idle are parasites.

SURGERY & OBSTETRICS

AND PROBLEMS OF BREEDING

Mules Operation—What Is It?

A YOUNG graduate, just out of school, complained that he had failed to make the grade in surgery because he couldn't describe "The Mules Operation," and we are not amazed, because many who have read and

which, needless to emphasize, has no place in examinations designed to determine the applicants' qualifications to practice.

The Mules operation is a surgical method of preventing blowfly infestation of the pudendum in sheep. Although not practiced in this country (so far as we know), it is apparently regarded as an operation of considerable importance in Australia, to judge from the fact that the Joint Blowfly Committee of the Department of Agriculture, South Australia, describes the technique and recommends "the modified Mules operation" in a special report, including five graphic illustrations, published in 1943. In view of the importance of sheep husbandry in Australia and the many useful hints on ovine medicine furnished by the



Fig. 1.—Mules operation, showing the two islands of skin resected on each side of the vulvo-anal region to obliterate nesting places for blowfly larvae. The illustration is oriented bottom side up (operating position) in the original picture.

read and even specialized in animal surgery would have found themselves in the same predicament. Not being indexed in text books nor commonly found in current veterinary literature, the question seems like unfair play of the catch-question variety

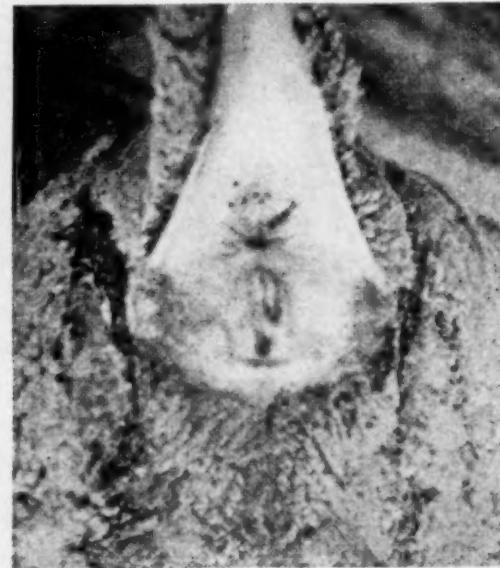


Fig. 2.—Mules operation, showing the enlarged and smooth bare area resulting therefrom.

veterinary service of that sheep-raising continent, it seems justifiable to place this

unique and little known (to us) surgical operation on record here.

The object of the operation is the prevention of "crutch strike," meaning blowfly-larva infestation in the region of the vulva. It is a plastic operation intended to enlarge the bare area surrounding the vulva by smoothing up the wrinkles along the lateral sides of the pudendum, which furnish nesting places for blowfly larvae. An oblong island of the folded skin is stripped out with the sheep shears at the time of docking, in such a way that the convex, medial edges of the two wounds are but one inch apart across the vulval orifice, (*see*, fig. 1). The result is shown in figure 2. At the same time, the tail is docked so as to overlap the distal commissure of the vulva one inch. This is the precise length the tails of lambs should always be docked, the Joint Blowfly Committee emphasizes. Quoting from the Committee's report: "Experimental surgery and experimental trials, as well as field experiences, have recently yielded results which call for some modification of methods employed in the past in the application of the Mules operation and in tailing."

That part of the Committee's report pertaining to this operation is entitled, "The Tail Length and the Modified Mules Operation for the Prevention of Crutch Strike in Sheep," and is published in the *Journal of the Department of Agriculture of South Australia* for December, 1943.

In regard to the so-called Mules operation, Dr. Benjamin Schwartz, head of the Zoological Division, U. S. Bureau of Animal Industry, writes: "We are not aware that the Mules operation or anything resembling it has ever been performed in this country for the control of blowfly infestation of sheep."

Sulfonamides in Compound Fractures

In an article entitled "Management of Compound Fractures," John A. Caldwell, M.D., Department of Surgery, University of Cincinnati (*J.A.M.A.*, Feb. 12, 1944), says: "We have not been convinced that the local scattering through a wound of a sulfonamide is useful and believe that it may possibly be harmful by causing irritation and so reducing tissue resistance. Consequently, we are awaiting the experience of

others before adopting this possible further tissue insult. . . . The patients, however, are given sulfadiazine (3 Gm. at once and 1 Gm. every four hours afterward) until the levels show 6 mg. per 100 cc. If there is predominance of streptococci in the wound, sulfanilamide is used until a level of 10 mg. per 100 cc. is reached."

Artificial Insemination in Horses

The obvious reasons why artificial insemination is less widely practiced in horses than in cattle and sheep are discussed at length by Dimock in the March 18, 1944, issue of the *Thoroughbred Record*. In the first place, collecting semen from stallions is more difficult than from bulls, and secondly, the Jockey Club has ruled that the stallion must actually serve the mare, since it is important that "the sire and the dam be accurately and definitely known" when registering the offspring. The rule, however, does not apply to the Standardbred, the American Saddle Horse, nor to the draft breeds. Besides the difficulty of collecting the whole ejaculate in a breeding sack or artificial vagina, the short duration of estrus (usually four to five days) is an obstacle when the semen has to be shipped from a distance. Furthermore, a satisfactory diluent and preservative for stallion semen has not been found. Says Dimock: "Artificial insemination has its place in reproduction of animals when well managed by persons who know it has been a success. However, published reports are of the successes not of the failures. The latter are spoken of in a soft voice."

Artificial Insemination in Great Britain

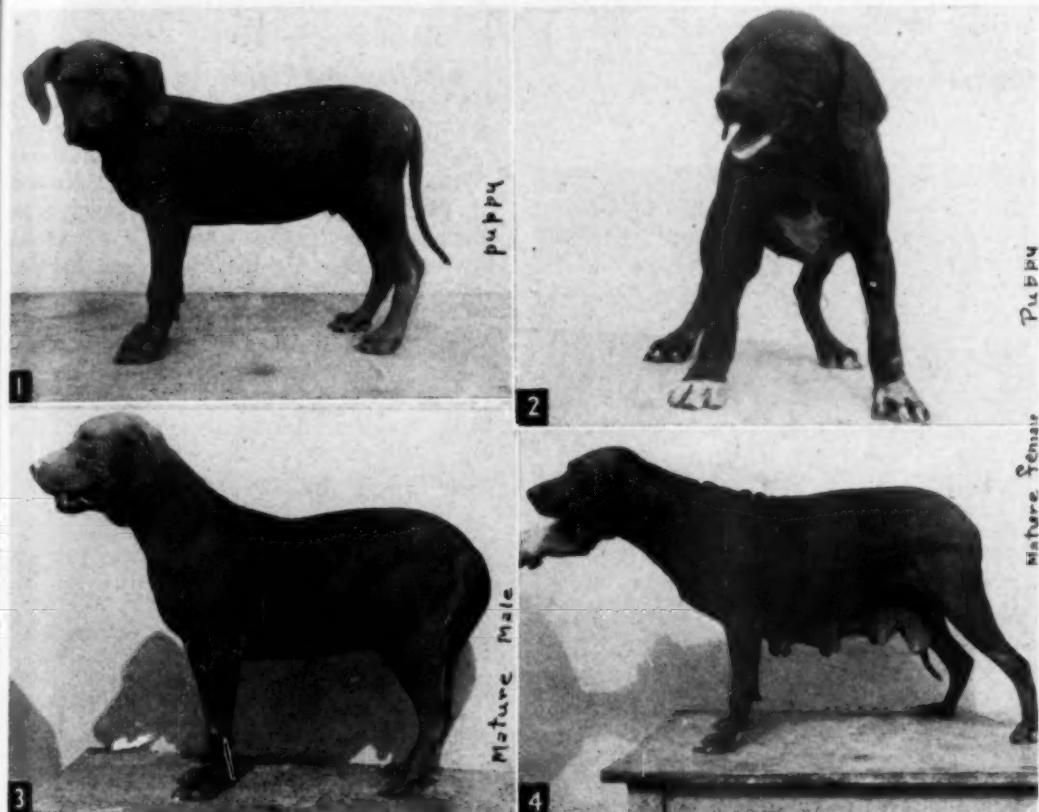
Two British experts (*The Cattleman*, 1944) are in this country studying the developments of artificial insemination in behalf of the Agricultural Improvement Council of Great Britain. The British Ministry of Agriculture controls but does not promote artificial insemination and the livestock societies are opposed to it. Their attitude is that of caution if not of aversion. Nevertheless, the Ministry has formulated regulations on the control of the practice and has licensed four stations to direct the work.

The Peruvian Bull Terrier: New Breed of Dog

On the large hacienda of Chiclin, in northern Peru, there has been developed a new breed of dog which, to the writer's knowledge, has not been reported in the United States. Having visited the hacienda

guard, that it is difficult to distinguish hog and dog from a distance.

The first selections which have resulted in this breed were made twenty-five years ago. Looking for a dark-colored, short-



(1) Puppy. (2) Puppy. (3) Mature Male. (4) Mature Female.

The Peruvian Bull Terrier—Famous Shepherd of Hog Herds in Peru.

several times, I have become interested in these dogs and have secured photographs, four of which are enclosed for reproduction.

These dogs were first developed by the Larco family, primarily to guard hogs. On this hacienda, they maintain about 8,000 Poland China hogs, and they have had as many as 12,000 at one time. The dogs practically live with the hogs in the corrals and are wonderful guards. Their color is so similar to that of the hogs which they

haired, lop-eared dog with a broad forehead similar to the American Bull Terrier, individuals of the semiwild Peruvian stray dog were selected. No recognized breed was used in developing the dog described. About 700 dogs have been raised and now it is a distinct breed found only on this hacienda in Peru, with the exception of a few animals that have been sent to Lima.

The present dog is dull black in color, almost a "dirty black," similar to the color of

a Poland China hog. About 40 per cent show white markings on the chest and feet, as can be seen on one of the photographs. The hair is very, very short and in some dogs is almost absent. Ears and tail are long. They are inclined to be roach-backed. They average 18 to 20 inches in height and 35 to 45 pounds in weight. They have the reputation of being devoted companions to their caretakers and exceptionally efficient porcine guards. In fact, pigs have never been stolen from any corral guarded by these dogs.—*Lt. Col. Russel McNellis, V.C., U. S. Army, Lima, Peru.*



Dr. R. R. Schultz of Mt. Vernon, Indiana, furnished us with this picture of triplet Hereford calves and their mother. The triplets were born on the Klein Hovey Lake farm near Mt. Vernon Jan. 10, 1944.

Drugs for Presurgical Preparation

Alcohol, in a 70 per cent concentration (by volume), has outstanding value against skin bacteria—the surgeon's hands and the surgical site. The demand by the armed forces in their "all out" war effort abroad and at home is reflected in the shrinking of the alcohol supply for medical and surgical use. However, 0.5 per cent of hydrochloric acid having antiseptic properties may be safely used as a substitute, and a 10 per cent solution of aluminum-potassium sulfate, although not germicidal, imprisons bacteria in skin that would otherwise release its flora. But, veterinarians habituated to the use of alcohol for presurgical

preparation will never be disappointed by using mercuric chloride solution after the usual cleansing with soap and water. Scrubbed into the skin of large animals in strengths of 1 : 500 to 1 : 1,000 with a stiff brush, it leaves a safe field to invade, although some hands are quite sensitive to its repeated action.

Posterior Pituitary Extract Prevents Retained Placenta

Subcutaneous injections of 5 to 10 cc. of posterior pituitary extract given at calving time reduced the incidence of retained placenta (J. Allyn Rogers in *Veterinary Extension Quarterly 93*, University of Pennsylvania). The statement is based upon records kept routinely for eight years by Dr. Rogers. Besides not being harmful, the injections were found to stimulate the uterus and to assist in the discharge of the placenta and parturient débris. The large breeds were given the larger dose. It is necessary for maximum results to give the injection immediately at the time of calving. Delay of even half an hour reduces the efficacy of the action.

Turner Portable Cattle Chute



A cattle restraining contraption widely used in the Southwest for dehorning, branding, vaccinating, blood testing, hoof trimming, and other veterinary work. The mechanism speaks for itself. It is the artifact of the Turner Dehorning Chute, Eagle Nest, N. M.

War checks the search for fundamentals but stimulates improvement of existing knowledge, weapons, and industrial processes.

CLINICAL DATA

Pickings from Progress*

Through organized humane education animals are treated more kindly and greater consideration is given to their health.

Despite the best of care animals are prey for infectious diseases, accidental injury, and organic derangement.



—From *Progress*, 1944

"See Your Dentist Twice a Year"

Dogs and cats, being naturally carnivorous, need meat in their rations. Lack of meat causes deficiency diseases and stops growth and development. Dogs of the Army K9 Corps are fed raw horse-meat.

The sick, pet-shop puppy is a familiar sight at the clinic. The insanitary pet

*Gleaned from *Progress*, Year Book of The Anti-Cruelty Society, Chicago.

shop is the source of mixed infections manifested by inappetence, diarrhea, vomiting, and emaciation and many have advanced rickets, not to mention highly contagious forms of distemper.

Our clinic is for the relief of suffering animals owned by persons unable to employ a private veterinarian. It does not compete with veterinarians.

In the treatment of nearly 7,000 clinical cases, it was evident that being hit or run over by automobiles accounts for the majority of serious injuries and fractures.

Dogs not kept under control are exposed to rabies, distemper, typhus, worm parasites, mange, leptospirosis, poisonings, digestive troubles, and misalliances which dogs kept on the leash escape.

Female dogs and cats not wanted for breeding should be spayed; male cats kept as pets should be castrated. Six to 8 months is the proper age for spaying kittens and puppies; castrate puppies and kittens young. Spaying and castrating stops the tendency to roam and does not materially change the temperament.

Worms injure fewer dogs than worm medicine. The worm mania has reached ridiculous heights, owing to clever advertisements and books sent free by medicine sellers. Worm remedies are powerful, and they are useful only when given under competent supervision.

The duration of price ceilings, priorities, and rationing, depends on how much you invest in putting an end to it.

a Poland China hog. About 40 per cent show white markings on the chest and feet, as can be seen on one of the photographs. The hair is very, very short and in some dogs is almost absent. Ears and tail are long. They are inclined to be roach-backed. They average 18 to 20 inches in height and 35 to 45 pounds in weight. They have the reputation of being devoted companions to their caretakers and exceptionally efficient porcine guards. In fact, pigs have never been stolen from any corral guarded by these dogs.—*Lt. Col. Russel McNellis, V.C., U. S. Army, Lima, Peru.*



Dr. R. R. Schultz of Mt. Vernon, Indiana, furnished us with this picture of triplet Hereford calves and their mother. The triplets were born on the Klein Hovey Lake farm near Mt. Vernon Jan. 10, 1944.

Drugs for Presurgical Preparation

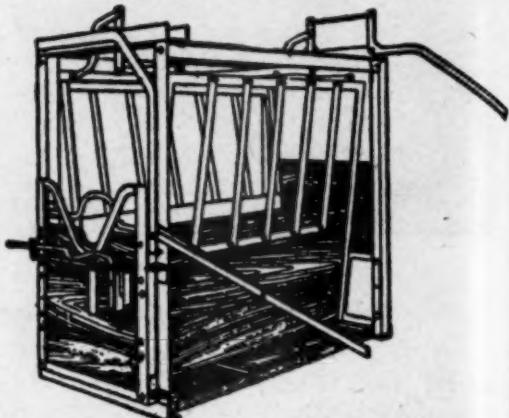
Alcohol, in a 70 per cent concentration (by volume), has outstanding value against skin bacteria—the surgeon's hands and the surgical site. The demand by the armed forces in their "all out" war effort abroad and at home is reflected in the shrinking of the alcohol supply for medical and surgical use. However, 0.5 per cent of hydrochloric acid having antiseptic properties may be safely used as a substitute, and a 10 per cent solution of aluminum-potassium sulfate, although not germicidal, imprisons bacteria in skin that would otherwise release its flora. But, veterinarians habituated to the use of alcohol for presurgical

preparation will never be disappointed by using mercuric chloride solution after the usual cleansing with soap and water. Scrubbed into the skin of large animals in strengths of 1 : 500 to 1 : 1,000 with a stiff brush, it leaves a safe field to invade, although some hands are quite sensitive to its repeated action.

Posterior Pituitary Extract Prevents Retained Placenta

Subcutaneous injections of 5 to 10 cc. of posterior pituitary extract given at calving time reduced the incidence of retained placenta (J. Allyn Rogers in *Veterinary Extension Quarterly 93*, University of Pennsylvania). The statement is based upon records kept routinely for eight years by Dr. Rogers. Besides not being harmful, the injections were found to stimulate the uterus and to assist in the discharge of the placenta and parturient débris. The large breeds were given the larger dose. It is necessary for maximum results to give the injection immediately at the time of calving. Delay of even half an hour reduces the efficacy of the action.

Turner Portable Cattle Chute



A cattle restraining contraption widely used in the Southwest for dehorning, branding, vaccinating, blood testing, hoof trimming, and other veterinary work. The mechanism speaks for itself. It is the artifice of the Turner Dehorning Chute, Eagle Nest, N. M.

War checks the search for fundamentals but stimulates improvement of existing knowledge, weapons, and industrial processes.

CLINICAL DATA

Pickings from Progress*

Through organized humane education animals are treated more kindly and greater consideration is given to their health.

Despite the best of care animals are prey for infectious diseases, accidental injury, and organic derangement.



—From *Progress*, 1944

"See Your Dentist Twice a Year"

Dogs and cats, being naturally carnivorous, need meat in their rations. Lack of meat causes deficiency diseases and stops growth and development. Dogs of the Army K9 Corps are fed raw horse-meat.

The sick, pet-shop puppy is a familiar sight at the clinic. The insanitary pet

*Gleaned from *Progress*, Year Book of The Anti-Cruelty Society, Chicago.

shop is the source of mixed infections manifested by inappetence, diarrhea, vomiting, and emaciation and many have advanced rickets, not to mention highly contagious forms of distemper.

Our clinic is for the relief of suffering animals owned by persons unable to employ a private veterinarian. It does not compete with veterinarians.

In the treatment of nearly 7,000 clinical cases, it was evident that being hit or run over by automobiles accounts for the majority of serious injuries and fractures.

Dogs not kept under control are exposed to rabies, distemper, typhus, worm parasites, mange, leptospirosis, poisonings, digestive troubles, and misalliances which dogs kept on the leash escape.

Female dogs and cats not wanted for breeding should be spayed; male cats kept as pets should be castrated. Six to 8 months is the proper age for spaying kittens and puppies; castrate puppies and kittens young. Spaying and castrating stops the tendency to roam and does not materially change the temperament.

Worms injure fewer dogs than worm medicine. The worm mania has reached ridiculous heights, owing to clever advertisements and books sent free by medicine sellers. Worm remedies are powerful, and they are useful only when given under competent supervision.

The duration of price ceilings, priorities, and rationing, depends on how much you invest in putting an end to it.

Mastitis in Heifers Following Injury by the Horn Fly, *Haematobia Serrata* Desv.

D. A. SANDERS, B.S.A., D.V.M.
Gainesville, Florida

MASTITIS in first calf heifers constitutes an economic problem of considerable importance in the nation's food program.

organisms may persist there until parturition.

During the course of mastitis investiga-



Fig. 1—Plaque-like lesion on inner flank characteristic of injury produced by the horn fly.

Palmer, Kakavas, and Hay¹ reviewed the literature relative to mastitis in heifers and reported upon its occurrence in several dairy herds. Schalm² concluded that mastitis streptococci may be transmitted to the udders of calves by sucking among penmates fed on infected milk and that the

tions in Florida, the problem of udder infections in first calf heifers of dairy and beef herds has been encountered. Since these infections occur among beef heifers reared on the range and in dairy heifers reared apart from the older animals and since there was no history of sucking among penmates, it was concluded that the mode of infection was obscure.

The bloodsucking muscid, *Haematobia serrata* Desv. was suspected of being responsible for the udder infections. Constant puncturing of the skin by these

Veterinarian, Florida Experiment Station, University of Florida, Gainesville.

¹Palmer, C. C., Kakavas, J. C., and Hay, B. A.: Mastitis in Heifers. Am. J. Vet. Res., 2, (1941): 18-34.

²Schalm, O. W.: *Streptococcus agalactiae* in the Udders of Heifers at Parturition Traced to Sucking Among Calves. Cornell Vet., 32, (1942): 49-60.

insects resulted in the formation of large plaque-like lesions on the surface of the body especially of the flank and escutcheon (fig. 1). Their habit of sucking blood from the tissues of the teats and adjoining surfaces of the udders of young heifer calves resulted in serious injury to these parts. Injury produced upon the udder tissues by the bloodsucking flies was evident from the presence of hemorrhagic lesions, erosions, excoriated areas, and scab formations on the tips and sides of the teats and adjacent tissue surface, and from the presence of abnormal udder secretion.

Bacteriological cultures obtained from the surface of these lesions and from the udder secretion revealed the presence of staphylococci, micrococci, diplococci, and streptococci. As the calves and yearlings became of breeding age the acute lesions disappeared from the surface of the udder tissues. However, evidence of previous injury by horn flies often was indicated by the occurrence of deformed teat sphincters, bleached appearance of the skin of the teats, and abnormal udder secretion. Periodic microscopic and cultural examinations of the udder secretion obtained from affected yearlings and pregnant heifers demonstrated that these microorganisms often became permanently established within the udder. At the time of calving, these infections frequently had caused serious injury upon the secreting tissues of the udder as evidenced by presence of blind quarters, fibrosis, induration, asymmetry, and abnormal udder secretion.

According to Herms³ "The horn fly has few if any equals as a cattle pest. The damage occasioned by these insects is chiefly through irritation and annoyance which results in improper digestion, disturbed feeding, weakened condition, loss of flesh and blood, and reduction in milk in dairy cattle. From ten to twenty-five minutes are required for the fly to fully engorge itself; during this time the fly withdraws and inserts its proboscis many times in a pumping motion."

Observations conducted at one dairy demonstrated that controlling the horn fly population reduced the incidence of mastitis in first calf heifers to the extent that it no longer constituted a problem of economic importance. It is concluded that the

horn fly, *H. serrata* was responsible for initiating mastitis infections in first calf heifers as encountered in the beef and dairy herds under observation.

TB Retests

Mopping-up operations against bovine tuberculosis showed that less than 1 bovine animal in 500 in the United States is tuberculous. Out of 9,308,000 tuberculin tests, there were but 17,167 (0.18%) reactors, the lowest percentage on record, and about one twenty-fifth the number found during the early years of the eradication campaign. The number found, however, is a signal not to stop the mopping-up process. The white plague is still here.

First CIBA Award

The prize of \$1,200 established by the Ciba Pharmaceutical Products, Inc., Summit, N. J. for outstanding work in endocrinology will be awarded during 1944 through the Association for the Study of Internal Secretions. The award will go to an investigator, not over 35 years old, in the field of either preclinical or clinical endocrinology. If the recipient chooses to pursue further studies in that field, the prize will be increased to \$1,800. Nominations should be sent to Dr. Henry W. Turner, 1200 N. Walker Street, Oklahoma City, Okla.

Sulfa Drugs in Actinomycosis

From Switzerland comes the report (*Am. Rev. Tuberc.*, March, 1944) of the complete cure of a 10-year-old boy chronically affected with actinomycosis of the lungs. Sulfanilamide and sulfamidothiazole over a period of three months accomplished that end. The patient was given 3 Gm. sulfanilamide daily in 10 doses and later 3 Gm. daily af cibasol (= sulfamidothiazole) in 6 doses. The treatment was discontinued when drug rash and fever appeared. There was no recurrence after six months.

Antireticular Cytotoxic Serum

A biological product made from the bone marrow of cadavers by Russian scientists is thought to be a possible remedy for old

³Herms, W. B.: Medical Entomology, 3rd ed. Macmillan, (1939): 337-339.

age, cancer, and hypertension. It is called antireticular cytotoxic serum and was preconized at the Institute of Experimental Biology and Pathology at Ufa. The product is a horse serum made by inoculating horses with spleen and bone marrow cells taken from fresh human cadavers. The research is a daring attempt to control the formation of the connective tissue that encroaches upon the vital cells and brings about the status of the aging body.—*From American Review of Soviet Medicine, December, 1943.*

Equine Encephalomyelitis in Iowa

A tabulated statement by counties issued by J. A. Barger, U. S. Inspector-in-Charge and C. C. Franks, Chief Veterinarian, shows that in 1943 — April* through November—518 veterinarians submitted 1,466 individual reports on equine encephalomyelitis. The report contains the following facts:

Number of cases (665 not vaccinated; 10 vaccinated)	675
Number of animals vaccinated.....	36,654
Number of deaths (142 not vaccinated; 1 vaccinated)	143
Lowest monthly incidence (April) ..	4
Highest monthly incidence (August) ..	198
Sickened 10 days or more after 2nd vaccination	10
(9 recovered; 1 died)	
Deaths 10 days or more after 2nd vaccination	1

An important epizootiological fact is that, though the incidence was low, the distribution was statewide. Only two counties were exempt. The morbidity was highest in Clinton County where 71 cases occurred, all 10 days or more after receiving the last dose of vaccine. A chart contained in the report shows that the morbidity mounted rapidly from May to August and then declined at the same rate to November.

*Two cases occurred before April.

The owning of animals by children and the teaching of humane treatment of them have a far-reaching effect on their approach to the problems of life.

Tomato Pumace

The dried, ground skins and pulp and seeds of tomato-juice production are a useful supplement for the feed of carnivorous animals: dogs, foxes, mink and other animals of fur farming. It is mentioned by Fish and Wildlife Service (1940) and by nutritionists of Cornell as useful (empirically) in correcting digestive upsets and as an economical substitute for whole tomato. The literature is not clear as to the factors contained in this processed material, but on the basis of feeding trials and wide usage among fur farmers, there is no doubt as to its nutritive value. "A satisfactory substitute for whole or canned tomatoes," says *The Fur Farmer*.

Cinchona Imports Rise

The Office of Coördinator of Inter-American Affairs reports favorable increases of imports of cinchona bark from South and Central America which are helping to replace the loss of quinine from the East Indies. The increase from Latin America is steady and mounting. In June, the amount imported was twice that of the average for the previous five months. One of the prominent sources is the El Porvenir plantation in Guatemala which is distributing 3,000,000 cinchona seedlings to other plantations and countries. In addition to imports from plantations, cinchona bark is being harvested from wild trees on a large scale in Peru—original home of quinine.

Mineral-Vitamin Mixtures

At the Ithaca conference for veterinarians, Prof. F. B. Morrison, distinguished livestock nutritionist of the Cornell University faculty, advised against the use of complicated mineral and vitamin mixtures of questionable value by farmers. When animals are unthrifty, farmers should consult their local veterinarians. Professor Morrison suggested (*Ithaca Journal*, Jan. 7, 1944). In other words, as these columns have frequently pointed out, deficiency diseases are medical problems, solved by first making as accurate diagnosis as possible. There is much to praise in the policy of encouraging the distribution of feed supplements through professional channels.

Determination of Vitamin A in the Blood

The spectrophotometric method and the Carr-Price reaction check satisfactorily with each other. The latter consists of treating a chloroform solution of the vitamin with antimony trichloride. If 4 cc. of plasma is used, a blue color strong enough to be read with the photoelectric colorimeter or by comparing the shade with copper sulfate standards develops. For practical purposes, no account need be taken of the fact that carotene also reacts to trichloride of antimony.

The factors which vary the vitamin-A level are: (1) the nutrition intake of vitamin A; (2) disturbance of intestinal absorption of vitamin A; (3) increased demand for vitamin A; and (4) disturbed interaction of liver and blood. There are also miscellaneous factors such as antioxidant in the intestine and tissues, and lipid concentration in the blood.

After withdrawal from the food, the vitamin-A level holds up for many months. The carotene level begins to drop sooner. Prolonged malnutrition reduces the vitamin-A level in the blood, as shown in the lower blood level among the poor compared with the upper strata of the population. In animals, the level is reduced in clinical avitaminosis A. In certain diseases, of which liver disease is one, the response to vitamin-A intake is not adequate. The demand is increased in the pregnant, and it is doubtful that infants require more than adults. Normally, the vitamin-A level is held up by the liver. In disease, the regulation may fail.

In men, the average vitamin-A content is 58 µg. per 100 cc. of plasma and 79 µg. of carotenoids; in women, it is 47 µg. per 100 cc. of plasma. In acute liver disease and cirrhosis, the plasma vitamin-A level runs quite parallel to the degree of liver damage, and the obvious cause lies in impaired intestinal absorption, although that does not explain the rapid drop in acute hepatitis since lack of vitamin-A intake is not evident within a few months. Inability of the liver to store vitamin A, or an increased demand may be factors. Although the liver carotenoids store is reduced, the authors found no relation of plasma carotenoid levels and liver damage, and they attribute the low plasma level to impaired

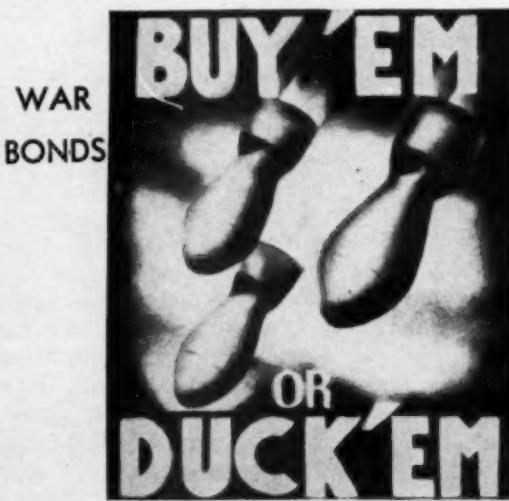
regulation on the ground that, while both carotene and vitamin-A levels depend upon intestinal absorption, the vitamin-A level depends also on liver regulation.—[Hans Popper, M.D., and Frederick Steigmann, M.D., Hektoen Institute of Medical Research (Chicago) and Department of Therapeutics, Cook County Hospital: The Clinical Significance of the Plasma Vitamin-A Level. *J.A.M.A.*, 123, (Dec. 25, 1943): 1108-1114.]

Tannic Acid Toxic

Tannic acid and tannin, containing galenicals, are widely used in veterinary therapeutics, always with the set idea that they are practically nontoxic. That this conception needs revision appears to be shown in experiments on laboratory animals (guinea pigs, goats, rabbits, and white rats). Injurious effects, observed in the treatment of extensive burns with tannic acid, were the basis of a test* revealing liver necrosis, damaged bone marrow, and increased permeability of capillaries with plasma leakage in experimental animals receiving small amounts subcutaneously.

The drugs involved are catechu, krameria, oak bark, and tannic acid *per se*. Veterinary pharmaceutical literature, although silent on the toxicology of this group of commonly used drugs, may need revision in that respect.

*Cameron, G. R., Milton, R. F., and Allen, J. W.: Toxicity of Tannic Acid, *Lancet*, 2 (Aug. 14, 1943): 179, *Abstract*, *J.A.M.A.*, 123, (Nov. 13, 1943): 729.



Some Clinical Experiences with Sulfapyridine in Small Animal Practice

ARTHUR H. BRYAN, V.M.D., M.A., V.C., A.U.S.

Fort Eustis, Virginia

WHEN Ehrlich discovered the action of arsenic-containing agents against the *Treponema pallidum*, or the spirochaete of syphilis, he raised the hope that it would be possible to find other specific chemotherapeutic agents against bacteria. For a number of years, little work was done in that field but as a result of the work of Domagk on sulfa drugs, new interest was aroused. Following his report in 1935, workers in France, England, and America showed that his original dye substance was effective probably because it was hydrolyzed in the body to yield sulfanilamide. Thus, sulfanilamide, and later sulfathiazole, Ag sulfathiazole, sulfadiazine, sulfaguanidine, sulfamerazine and sulfasuxidine, and others have come to be recognized as specific bactericidal agents. This final breakdown of the belief that it would not be possible to find chemotherapeutic agents against bacteria has been a stimulus to both experimentalists and clinicians, especially during the war.

While exploring this field, it was found that sulfanilamide is capable of causing severe reactions, such as acute hemolytic anemia and agranulocytosis, which may be fatal. In addition it was found that sulfanilamide causes such unpleasant effects, as nausea, dizziness, fever, and, less frequently, hepatitis and psychoses. Sulfanilamide is particularly effective against the streptococci, but is not effective against other specific and nonspecific cocci. These facts about sulfanilamide led to the search for related compounds which might be less toxic and possess a wider range of effectiveness. Thousands of sulfonamide compounds have been prepared and tested, but relatively few have been found to possess sufficient advantages to justify keeping them in the clinician's armamentarium. Among these currently and readily available to the veterinarian are sulfanilamide, sulfapyridine, sulfaguanidine, sulfathiazole, sulfadiazine, sulfasuxidine, and sulfamerazine.

I have already reported some observations on the use of sulfanilamide, sulfaguanidine, sulfadiazine, and sulfasuxidine in large and small animal practice. This contribution presents some experiences with sulfapyridine over a period of two years. This drug which Whitby reported to possess activity against the pneumococcus of sufficient power to justify its use was studied in man by Evans and Gaisford. The drug possesses outstanding properties in the treatment of pneumococcal pneumonia in man. It has reduced the wartime mortality of pneumonia to below 7 to 8 per cent when used under hospital conditions. The effectiveness of sulfapyridine, like sulfathiazole, is not limited to the pneumococcal infections alone. It possesses activity against streptococci, gonococci, and staphylococci.

Considerable work has shown that different strains of the same organism, isolated from different species of animals, vary greatly in their response to the action of these agents. It is, therefore, necessary to determine their field of usefulness and their limitations by careful observations.

CASE REPORTS

1) Mongrel bitch, age 11 years, apparently suffering from acute, rheumatic arthritis; temperature 102.2 F., distended, stiff, hot, and painful joints; recovery within four days after using sulfapyridine in 5-grain doses every four hours.

2) Dystocia in a wire-haired Fox Terrier; animal in labor four days, temperature 104.5 F. Examination revealed 4 decomposed pups, and a fetid discharge from the vagina. The dead pups were removed with forceps. Sulfapyridine was given orally four times a day in 5-grain doses. The dose was reduced gradually during the first three days and stopped on the fifth day, recovery complete in one week.

3) Cocker Spaniel with abscess of the mammary glands; temperature 102 F., purulent discharge. Powdered sulfapyridine was used topically and 5-grain doses were given orally every four hours, complete recovery in five days.

4) Boston Terrier with catarrhal mastitis following parturition. Sulfapyridine was given in 5-grain doses four times a day. The discharge

ceased, swelling subsided, and the animal recovered.

5) Toy Pommeranian, age 5 years, alveolar periostitis; tooth abscesses, breath fetid, pneumonia developed with temperature 105 F. Sulfapyridine given in 5-grain doses four times a day apparently gave good response. However, two weeks later the animal developed convulsions, vomited blood, and died.

6) Shepherd, age 9 years, suffering from pneumonia; course protracted, drug therapy tried as a last resort after two weeks of illness. Patient died of empyema.

7) Eight cases of canine encephalitis, as evidenced by recurrent convulsions; treated with sulfapyridine in doses up to 30 gr. a day, depending upon the size of the dog. One died, 3 were destroyed, and the remaining 4 recovered under combined sulfapyridine and Medinal treatment. The latter is monosodium diethyl barbiturate, readily soluble in water and suitable for hypodermic use in doses of 5 gr. daily.

8) Several canine chorea cases showed observable response to sulfapyridine medication. Spasmodic contractions were reduced with 5-gr. hypodermic injections of Medinal. One recovered slowly within two months, and the others showed some improvement, but were later destroyed at the owner's request.

9) Several young bitches in estrus, bred accidentally from time to time, were brought in for oophorectomy and hysterectomy. Operations, purposely exposing the peritoneum to infection to test the local response to dusting sulfapyridine into the peritoneal cavity directly before suturing, brought uneventful recovery. This procedure evidently prevented the development of peritonitis, sepsis, or wound fever.

10) Twenty odd canine and feline oophorectomies, with the peritoneum definitely exposed to infection, all made an uneventful recovery when powdered sulfapyridine was introduced into the abdominal incision prior to suturing. In addition, the incision itself was dusted with the powdered drug with resultant healing by primary intention. The postoperative temperatures were practically normal, and there was no evidence of wound fever, peritonitis, or stitch abscesses.

Some eighty odd clinical cases of distemper observed over a period of two years in various stages of the disease responded to graded doses of sulfapyridine promptly, particularly when administered in the early stages of the disease. Recoveries from the catarrhal, skin and eye forms, with the primary bronchial symptoms, were noted within forty-eight to seventy-two hours of administration of the drug. In these cases, temperatures dropped from around 104F. to normal, and the catarrhal symptoms disappeared promptly also. In

scores of catarrhal, conjunctivitis sequels, instillation of the powdered drug directly into the eye, blown in with a straw, was effective in acute, but less so in chronic cases. In purulent catarrhal rhinitis, a common phase of distemper, the internal administration of the sulfapyridine usually cleared up the condition, however, blowing the powdered drug in the nasal cavities with a straw, appeared to help. It was noted that sulfapyridine in the early stages tended to act prophylactically in preventing intestinal and pneumonic symptoms.

It has been noted that some dogs seem to have a gastric hypersensitivity to sulfapyridine with resultant emesis. This condition can be prevented by preceding the drug with small doses of any of the barbiturates such as phenobarbital half an hour before the sulfapyridine. To keep up blood levels during the course of distemper, 7.5 gr. were administered to medium sized dogs every four hours including one dose during the night if practicable. Small breeds and cats received 5 gr. four times a day and large dogs up to 10 gr. at four-hour intervals. To these dosages, early canine distemper cases responded most promptly, and recovery was practically permanent, without sequelae such as chorea and fits.

It was particularly noted that in chronic distemper cases the drug was apparently valueless, in fact contraindicated. In the empyema, sequel of distemper pneumonia, cases terminated fatally irrespective of sulfonamide therapy.

Over a period of two years, all types of traumatic injuries, including penetrating bullet wounds, lacerations, compound fractures, burns, deep incised cuts, extensive skin injuries, and deep muscle and tendinous trauma with or without infection, were treated with only a preliminary cleansing, followed by local dusting or implantation with sulfapyridine, preferably as a fairly coarse powder or combined with boric acid power to prevent caking. The results simulated those reported from Tunisia, Italy, and New Guinea by miliary surgeons, when local sulfonamide therapy was considered extremely valuable. In canine and feline practice, sulfapyridine is virtually a specific in local infections. In those sulfonamide resistant cases that fail to respond promptly, penicillin locally will prove probably effective.

DISCUSSION

These cases indicate that sulfapyridine has a wide field of usefulness in small animal practice. This series along with hundreds of medical and veterinary reports is sufficiently comprehensive to justify definite conclusions.

The results obtained in several cases of pneumonia were equivocal. Sulfapyridine has considerable use in all veterinary pneumonias, except verminous and hypostatic. The dosage is 1 gr. per lb. of body weight, divided in 4 equal doses. It can be administered during the first day, and the amount decreased 50 per cent each succeeding twenty-four hours. In addition, the results with dystocia, mastitis, and post-operative peritonitis or trauma are very encouraging.

Four of the 8 cases of encephalitis recovered. This suggests that sulfapyridine may have considerable selective action in this disease. It will be necessary, however, to obtain a rather extensive series before conclusions are justified. The results in chorea are not surprising, since supposedly, most of the damage to the nervous system has been done when the condition is present. The drug has prophylactic value in preventing, to some extent, the nervous sequels of distemper.

The oophorectomies, performed on the bitches and the cats, represent an interesting set of clinical observations. Used prophylactically, sulfapyridine appears to possess outstanding properties. None of the clinical patients developed any bad after effects from purposeful exposure to peritoneal infection.

It is interesting to note in reviewing numerous cases of penetrating war wounds of the abdomen, that the sulfonamides, including sulfapyridine, have proved of enormous value in reducing the mortality from peritonitis resulting from such trauma. In fact, the author notes that most cases of generalized peritonitis, secondary to perforated appendices, responded satisfactorily to the intraperitoneal administration of 1 to 4 Gm. of some sulfonamide drug, with oral administration as well, if indicated.

SUMMARY

Sulfapyridine is practically specific in the primary stages of canine and feline distemper and has prophylactic value in preventing many sequels of the disease. It has

selective value in puerperal sepsis following dystocia and cases of catarrhal or purulent mastitis. Considerable further work will be needed before its value in canine encephalitis and chorea can be elucidated. It has local uses in conjunctivitis, otitis, rhinitis, abscesses or ulcers, war wounds, and infected blast injuries. Sulfapyridine is of considerable value in veterinary operations performed under field conditions where it is difficult to observe the principles of asepsis. This drug has considerable value when dusted directly into the abdominal cavity in peritonitis when infection has been established and it can also be used to prevent peritonitis. Large doses do not appear to be necessary, since these cases responded to doses of 10 to 35 gr. (1/2-2 Gm.) per day.

The author is indebted to Mr. D. F. Green of Merck and Co., Rahway, N. J. for the supplies of sulfapyridine used in these experiments.

Bibliography

- Long, P. H., Haviland, J. W., Edwards, L. B., and Bliss, E. A.: The Toxic Manifestations of Sulfanilamide and Its Derivatives with Reference to Their Importance in the Course of Therapy. *J. A. M. A.*, 115, (1940): 364-368.
- Bryan, A. H.: Some Therapeutic Indications for Sulfanilamide in Small Animals. *North Am. Vet.*, 20, (1939): 46-47.
- Ketchersid, J. R.: Clinical Studies of Sulfapyridine in Small Animal Practice. *J.A.V.M.A.*, 96, (1940): 661-662.
- Rosenburg, S., and Wall, W. M.: The Treatment of Diffuse Peritonitis by the Direct Intraperitoneal Introduction of Sulfanilamide. *Surg. Gynec. Obst.*, 72, (1941): 568-578.
- Bryan, A. H.: Clinical Observations on the Use of Sulfapyridine in the Treatment of Canine Distemper. *Vet. Med.*, 36, (1941): 365.
- Bryan, A. H.: Sulfapyridine in the Treatment of Feline Distemper. *Vet. Med.*, 36, (1941): 434.
- Bryan, A. H.: Therapeutic Indications for the Use of Sulfathiazole in Small Animal Practice. *Vet. Med.*, 37, (1942): 138.
- Bryan, A. H.: Sulfapyridine Therapy in Local Infections. *J.A.V.M.A.*, 100, (1942): 73.
- Bryan, A. H., and Bryan, C. G.: Principles and Practice of Bacteriology, 2nd ed., Barnes and Noble, Inc., New York, (1942): 232-238.
- Bryan, A. H.: Sulfaguanidine (Sulfanilyl Guanine Monohydrate) in Enteric Infections of the Dog and Cat. *Lederle Vet. Bul.* 11, (1942): 5.

When man can duplicate in the laboratory what the solar rays do to plants, he will be freed from the grueling labor of agriculture and the cruel uncertainties of the elements.—*Pei-Sung Tang, in the Scientific Monthly.*

NUTRITION

MATERIAL FURNISHED BY THE COMMITTEE ON NUTRITION

The Use of Iodine in Animal Feeding

Everyone is familiar with the fact that iodine is a mineral element which is essential for all animal life. It is also well known that in many regions of the world the soils are so deficient in this element that food plants grown in these areas, and the ground water, fail to supply enough iodine to support normal life. In the United States, this area involves, roughly, the watershed of the Great Lakes and the St. Lawrence river, Nebraska, the Dakotas, Utah, Nevada, Colorado, Montana, and most of the Pacific coast states. The most of Canada must also be included in these iodine-deficient regions. In these areas, it is necessary to supplement the rations of farm animals in order to prevent symptoms of iodine deficiency.

SYMPTOMS OF IODINE DEFICIENCY

Iodine is necessary for the production of thyroxin, a hormone produced by the thyroid gland. This hormone, to a large extent, controls metabolism. In man, the most noticeable effect of iodine deficiency is an enlargement of the thyroid which is commonly called simple goiter.

Griem, Hart, Kalkus, and Welch (1942), have summarized the symptoms of iodine deficiency in farm animals as follows:

In farm animals, goiter usually shows itself in the young at birth as a result of a deficiency of iodine in the ration of the mother during gestation. The young thus affected are born weak or dead. On a deficient diet, the mother is not able to supply the fetus with enough iodine. The danger is thus increased in the case of multiple births. In calves, lambs, and kids the enlargement of the gland is very evident in the new born. In pigs, the most outstanding symptom of deficiency is hairlessness. The young are bloated, have thick skins, and puffy necks. In foals, the only symptom may be extreme weakness at birth, resulting in an inability to stand and suck. Birds as well

as mammals have enlarged thyroids as a result of iodine deficiency.

In respect to poultry, Titus (1942), states that only a few cases of goiter have been reported in this country but that this condition is more common in certain sections than is generally realized. Where it has been studied, goiter does not appear to seriously affect the health of the chickens or to cause a heavy mortality. Studies of the effect of adding small quantities of iodine to the rations of poultry have generally yielded no beneficial results. He feels however, that it is probably a good practice to use iodized salt in poultry rations in regions known to be iodine deficient.

Iodine deficiency may be detected in dogs by the appearance of goiter. A communication from a veterinarian in the goiter belt states that while this condition was very common twenty years ago, it is rarely seen today.

SUPPLYING IODINE IN DEFICIENT AREAS

In iodine-deficient areas, it is the accepted practice to feed iodized salt. The iodine requirements of farm animals is explained by Griem and coworkers as follows:

In line with common commercial practice, advice of college feeding authorities, and the light of practical experience, the Association of American Feed Control Officials defined iodized salt as common salt (NaCl) containing not less than 0.015 per cent of iodine, uniformly distributed. Under this definition, manufacturers supplied for the feed trade the same material furnished for human consumption. The continuous feeding to farm animals of rather large intake of iodine above the requirement is a practice which may result in definite harm. Thus, duToit and his coworkers showed that the feeding of 20 mg. of potassium iodide daily to ewes had a detrimental effect on reproduction. At the rate of 2 gamma (0.002 mg.) per kilogram, a 1,000 lb. cow

would require approximately 1 mg. of iodine daily. One pound of iodized salt (0.015 per cent iodine) in 100 lb. of grain (a common recommendation) would supply daily about 7 mg. of iodine to an animal eating 10 lb. of the grain mixture. This amount (seven times the requirement specified) is certainly sufficient for protection against goiter and for all physiological needs.

This product when used on the farm in the goiter belt has alleviated all gross symptoms of iodine deficiency. No conclusive evidence has been published which would indicate that iodized salt, iodized limestone, or iodized mineral feeds need to carry approximately ten times this amount of iodine, as they often do.

While the exact requirement of all species for this element has not been determined, it is probably safe to assume that 0.001 mg. of iodine per pound of body weight per day will prevent iodine deficiency. In general, it may be said that the use of properly iodized salt is caring for the problem.

LOSSES OF IODINE FROM IODIZED SALT

It has been found that iodized salt may not supply a sufficient amount of this element to protect animals against an iodine deficiency. Griem and coworkers have the following to say regarding this loss of iodine:

If all the iodine added to salt by the manufacturer were retained, its value as an iodine carrier and goiter preventive would be enhanced. Unfortunately, this is not the case and the loss of iodine from iodized salt has presented a real problem to the manufacturer. The loss of iodine from salt on aging has been observed for some time. In many cases the salt discolors, becomes spotty in appearance, and smells bad. These facts have been a real hindrance to sales of iodized salt. The discoloration is due to the liberated vapors of iodine. In the case of block salt, colored brown with added ferric oxide, and to which iodine has also been added, the loss of iodine may be overlooked. Nevertheless, the loss of iodine is a real one. We know of instances where farmers have fed iodized stock salt and then have experienced an outbreak of goiter in their farm animals. On analysis of the salt, no iodine was found.

Analyses of iodized salts by the Feed and Fertilizer Division of the Wisconsin Department of Agriculture over a period of several years have disclosed a considerable loss in iodine from the iodized salts of reputable manufacturers. There is no question of the producer's honesty in putting the iodine into the salt and mixing it well, but the loss oc-

curred because of conditions over which he had no control.

Fortunately, methods have been developed which make it possible for manufacturers to stabilize iodized salt thereby preventing the rapid loss of iodine from the mixture. This process consists of adding a stabilizer (a mixture of chemicals which bind the iodine thereby preventing its loss from the salt) to the salt along with the iodine.

It has also been found that this stabilizing mixture is necessary in mineral mixtures to which iodine has been added; otherwise the iodine soon volatilizes, leaving the mixture worthless as far as the iodine is concerned.

FEEDING SOYBEANS MAY INCREASE NEED FOR IODINE

There is a possibility that the increased use of soybeans in the rations of swine and poultry may increase the need of these species for iodine. This possibility was studied at the Colorado Experiment Station in 1941 by Wilgus, Gassner, Patton and Gustavson.

Working with chickens and rats, it was found that soybeans contain a goitrogenic substance. Rations for chicks containing only 12 per cent of soybean-oil-meal caused an enlargement of the thyroid gland. As the soybean content of the ration was increased, the effect on the thyroid was more marked. Expeller-process meal produced less change in the thyroid than meal produced by the solvent process, or ground, whole soybeans. Similar work with rats showed that their thyroid was also affected by this goitrogenic factor in soybeans but to a lesser extent. No detrimental effect, other than that on the thyroid, resulted from the use of soybean meal. The addition of iodine or substances containing iodine to the ration prevented the development of goiter.

Verbal reports from some practitioners indicate that the increased use of soybeans and soybean products in the rations of swine may possibly be causing the development of iodine deficiency in areas where this condition has been more or less unknown. Should this prove to be true, the addition of iodine to the ration would be indicated.

The report of the Special Committee on Nutrition of the Illinois Veterinary Medi-

cal Association, January, 1944, recommends the following method of supplying iodine to sows:

Iodine deficiency can be prevented by feeding small amounts of potassium iodide during the last half of pregnancy. Two level tablespoons of potassium iodide dissolved in water, mixed with the grain or added to the drinking water will furnish enough iodine for fifty sows.

It is not known whether the use of soybeans in the rations of cattle will lead to this trouble. It is doubtful if the use of soybean products in the pet animal foods will greatly increase the iodine requirements of these animals, for the work of Wilgus and associates indicates that this goitrogenic principle in soybeans may be partially destroyed by heat. Where iodized salt is used, the following facts should be kept in mind:

- 1) Make sure that it is prepared by a process which stabilizes the iodine.
- 2) It is not advisable to purchase a large stock of iodized salt at one time.
- 3) Unless the stabilizing process has been used in the preparation of mineral mixture, the mixture will soon become a poor source of iodine.
- 4) Iodized salt, which gives off an odor of iodine, is a poor source of this element.

Practitioners should be on the lookout for symptoms of iodine deficiency and they should recommend the use of iodized salt which has been prepared by the stabilizing process. This committee will appreciate it if practitioners will report to them any cases of iodine deficiency which follows the use of soybeans in the rations of farm animals.

Bibliography

Griem, W. B., Hart, E. B., Kalkus, J. W., and Welch, Howard: Iodine—Its Proper Use and Stabilization. Second Report of the Committee on Nutrition of the National Research Council, Washington, D. C. (Reprint and circular Series No. 111, May, 1942).

Titus, Harry W.: Nutritional Diseases of Poultry. United States Department of Agriculture Year Book—Keeping Livestock Healthy. (1942): 1075-1105.

Wilgus, H. S., Gassner, F. X., Patton, A. R., and Gustavson, R. G.: The Goitrogenicity of Soybeans. *J. of Nutr.*, 22, (July, 1942): 43-52.

Living men recall the faded blue jackets tramping the streets and highways following the Civil War, and the middle-aged generation remembers the tattered khaki overcoats in the breadlines of the 1920's. War Bonds will prevent these ungodly scenes after World War II, provided you buy them.

The Livestock Feed Situation

Talking before the North Carolina Conference for Veterinarians* in January, 1944, D. S. Coltrane, assistant to the commissioner of the North Carolina department of agriculture, presented some interesting facts regarding the situation now existing on the livestock production front in this country. In conclusion, the speaker presented the following concise information on the subject:

The total supply of concentrate feed for the feeding year Oct. 1, 1943 to Sept. 30, 1944, after allowing for minimum carryovers (not normal carryovers) a year later, will be about 5 per cent less than the quantity actually fed last year. The quantity of feed grains available for feeding, beginning Oct. 1, 1943, is expected to be between 5 and 10 per cent less than the quantity fed during the previous year, and the quantity of wheat also may be slightly less. The total supply of protein meals and other high protein feeds will be about the same—possibly 3 to 5 per cent more.

On the other hand, the number of livestock and poultry on farms Jan. 1, 1944, is about 10 per cent larger. Therefore, in order to maintain the largest practical balanced production of livestock and poultry, our prospective feed supplies will have to be distributed and utilized with a great deal more care than usual.

Some very important factors in bringing the animal population and the feed supplies in balance are as follows: marketing hogs at lighter weights than in the past two years; placing more dependence on roughage for cattle and sheep; shorter and lighter feeding of beef cattle; heavier culling of poultry flocks; and all-around better care and management of livestock and poultry. Furthermore, it is necessary, because of feed supplies, to level off hog farrowings and broiler production to about the 1942 levels.

If we use our available feed supplies as efficiently as we did in the years immediately preceding 1943, when we used 8 per cent more feed per unit of livestock and poultry products produced, they should be sufficient to maintain or slightly increase milk production; maintain egg production at the 1943 level; and feed out more cattle, but to weights slightly below average and to good grades rather than choice and prime grades. In addition, we must cull inefficient animals from herds and flocks, adopt more economic and efficient feeding practices, and discourage inexperienced persons and

*The Sixth Annual Conference for Veterinarians held at State College, Raleigh, N. C., Jan. 26, 1944.

those without adequate facilities from entering livestock and poultry production.

Finally, the veterinarian can be most helpful in this feed conservation program. Healthy, well-fed animals make more efficient use of their feed. Animals with bad teeth and those infested with lice, mites, and worms are wasteful of feed. Your help along these lines is needed more than ever before.

Fish and Fish By-Products for Pet Animal Feeding

With present restrictions on foods, dog owners are finding it more and more difficult to obtain an adequate supply of animal protein for their pets. In many areas, fish and fish offal offer a good source of this type of protein. It is usually easily obtainable. Besides this, it is inexpensive, it contains a high per cent of protein, and it is not rationed.

A recent survey indicates that few veterinarians are availing themselves of this source of animal protein. The following practical hints regarding the use of fish and fish by-products have been obtained from several practitioners in Westchester County and Long Island, New York, who have been feeding fish in their hospitals.

They obtain, from a local fish man, the material which he normally throws away, that is, heads, tails, fins, skeletal structures, and the contents of the body cavity. All of the offal which is dropped through the hold of the cleaning table can be used. This mixture is boiled thoroughly and passed through a chopper. It is then ready for mixing with biscuit or cereal base products. The bones, heads, scales, and offal seem to cook up nicely. The animals like the mixture.

Where pet owners are making use of the fish trimmings, they should be cautioned to either pass the boiled mixture through a food chopper or to pick out all large bony structures before offering it to the animals. Once the fish has been cooked, it can be kept under refrigeration for several days and thus be ready for feeding when needed.

Dr. Daniel Merriman, Director of the Bingham Oceanographic Laboratory, Yale University, points out that, at present, the fish products which are being used in the above manner, consist almost entirely of the trimmings from the species which are

most in demand for human food. Many species, which are fit for human consumption, are thrown back at sea because there is so little demand for them. An increased demand for "trash" species such as angler fish, skate, and sea robin, would probably increase the availability of these fish as well as the cheaper species which do not now find a ready market. Following are some of the most easily obtainable and most abundant varieties found on the New York and Boston markets: flounder, haddock, mackerel, ocean pout (winter only), pollock, hake (summer only), bluefish, and whiting (summer only).

Veterinarians in areas where fish and fish by-products can be easily obtained will do well to make use of this source of animal protein.

Production of Biological Products

The quantity of biological products made and condemned by BAI-licensed laboratories during the fiscal year ending June 30, 1943, is given as follows in Chief A. W. Miller's annual report:

	Quantity produced*	Quantity destroyed†
	(cc.)	(cc.)
Anti-hog-cholera serum.....	1,734,288,000	9,300,000
Hog-cholera virus	481,375,000	19,289,000
Hog-cholera vaccine	8,193,000	3,775,000
Aggressins	20,269,000	309,000
Aggressins (1,000 disks)	46,000
Antitoxins	2,848,000	120,000
Bacterins	182,622,000	2,147,000
Bacterins (1,000 disks)	20,000	7,000
Mixed bacterins	77,285,000	3,228,000
Diagnostics	224,000	37,000
Toxoids	1,482,000	20,000
Other vaccines & viruses	41,505,000	5,516,000
Other vaccines and viruses (1,000 disks)	1,101,000	74,000
Other vaccines and viruses (Gm.)	32,551,000	2,476,000

*Details on production of these products furnished on request to the BAI.

†Includes products under preparation and those finished for marketing.

Since the early symptoms of dietary deficiency escape detection to a considerable extent, and the entities they ought to identify remain to be described, the scientific application of the knowledge of nutrition is hard to employ in veterinary practice. In the practice of medicine, empiricism stays on until science explains.

EDITORIAL

Nazi Controlled Nutrition in France

News from France is scarce. The seal of the censors is hermetic. So, almost anything that will shed light on the state of the French people is news. In March, 1943, Professor Charles Richet, of Paris, wrote in *Bulletin de l'Ordre Des Médecins* (*Bulletin of the Association of Physicians*): "I assert that in the towns 10,000,000 persons are suffering from hunger and 2,000,000 of these are likely to die from hunger either directly, or indirectly through some infectious disease." The professor was arrested and imprisoned. His fate is not known.

The following, taken from a report of "Vichy France" to the Third Reich, was not intended to find its way beyond the iron-bound sanctums of these two countries. The author is Minister of Agriculture Max Bonnafous at Vichy.* The report is labeled confidential. It was meant for the German authorities only.

The basic meat ration is 90 Gm. (3.25 oz.) a week, 105 Gm. (3.75 oz.) for hard and 210 Gm. (7.5 oz.) for very hard workers. The daily basic diet for France is 884.4 calories. Even with extra quantities distributed from time to time in big centers, it barely reaches 1,100 calories. In 1917-1918, the Germans complained that a ration of 1,600 calories was the cause of their emaciation, loss of strength, low blood pressure, bradycardia, and psychological breakdown, and they called the state semistarvation. With but 1,100 calories, except for a favored few, there is also a deficiency of fats, proteins, and sugar.

Ill-Health Among Adults.—Lack of protective foods, such as animal fats, butter, cheese, and eggs, causes a great weakening with consequent increase in such diseases as tuberculosis, which is increasing alarmingly. According to Dr. Grasset, Minister of Health at Vichy, 35,000 of the 4,963,000 inhabitants of the Seine Department are afflicted with tuberculosis, and

the proportion of young women among the patients is alarmingly high. For instance, in 1938, the number of new cases for each 100,000 persons was 141; in 1941, 161; in 1942, 176. The death rate from tuberculosis has risen correspondingly.

In a paper to the *Académie de Médecine*, Marcel Moine reported the following facts for a single department—the Oise. The number of sputum analyses with positive results for every thousand patients has risen from 44.5 to 47.3 per cent. In another department, according to Etienne Berthet, the number of tuberculous persons detected has risen one-third. He says that the ill-balanced diet is perhaps more responsible for this outbreak than undernourishment due to insufficient total intake.

In 1941, the Germans sent back to France a large number of prisoners of war, all tuberculous. Apart from the dying, all were borderline cases for treatment. The majority had bilateral, and many extrapulmonary, lesions. Of the artificial pneumothorax cases, 70 per cent needed division of adhesions and 15 per cent needed further operation. This was a result of too long delay in treatment. The patients were discharged from the Army too soon, about six weeks after repatriation—and more of them could not be kept under treatment as they were impatient to go home. They are, therefore, a permanent source of infection. Besides these, an increasing number of workmen are returning to France after only a few months in Germany to die of acute tuberculosis. Before the war, France was well supplied with sanatoria and hospital beds but she is now largely deprived of them by enemy requisition. There is also a great deficiency of surgical and medical supplies. Therefore, the patients have to wait for six to eight months after detection before they can be admitted to a tuberculosis hospital.

Acute forms of pulmonary tuberculosis are frequent. Extension of the lesions is rapid. As a rule, only three months elapse between the first symptom and death. Tuberculosis is not the only cause of distress. Many deaths occurring from no apparent cause are thought to be partly due to deficiency in vitamins, especially vitamin B, and partly to deficiency of sugar. The situation is most tragic in towns.

*From the Section of Medicine, *Proceedings of the Royal Society of Medicine*, January, 1944: Discussion on the State of Nutrition in Enemy-Occupied Europe. The Health Situation in France by Col. W. Vignal, French Army Medical Corps.

More and more men collapse in factory, office, or street; many die on being brought home from no other cause than extreme weakness.

Among the working classes, emaciation is the lot of everyone, and in some workers, the decrease in weight is catastrophic. Owing to this universal weakness among workmen, the number of accidents at work has greatly increased. In a metal works near Lyon, during the first five months of 1941, 61 work days were lost through accidents. During the corresponding months of 1942, 147 days were lost. The signs of undernourishment are progressive asthenia, incapacity for any exertion, and attacks of dizziness. Other signs are retro-orbital and temporal headache, copious night sweats, and great susceptibility to colds. The mental syndrome includes loss of memory, apathy followed by irritability, auditory hallucinations, and deep depression. Clinically, there is low blood pressure, loss of weight varying from 12 to 15 kg. in a few months, with hypoglycemia and ascorbia. The blood count shows leucopenia in 32 per cent, leucocytosis in 22 per cent. In 58 per cent, the mononuclears are above 35 per cent; in 55 per cent, the eosinophils above 4; and in 6 subjects above 10 per cent.

According to Girard, Louyat, and Verain, the troubles observed in these subjects were said to be due to not only undernourishment but also, and probably mainly, to an ill-balanced diet causing defective assimilation of vitamins, animal proteins, fats, and calcium, and thus a chronic dietary toxemia.

The impairment of function of the vegetative nervous system was probably due to avitaminosis B; but the great difficulty of finding food and its bad distribution have also brought about, especially in towns, general vindictive and grasping mentality which may cause social upheavals.

Defective hygiene, due to the great scarcity of soap, hot water, and other facilities for cleanliness, is responsible for a great increase in skin infections. Delousing and disinfecting posts have been installed in Paris and the suburbs. Fortunately, there have been but a few cases of typhus, which have been quickly dealt with.

Ill-Health Among Children.—The situation among children is even more alarming. O. Forel, a Swiss physician, investigated 45,060 children in towns and industrial centers in the Unoccupied France of 1942. His figures show that, of children 3 years old, 22 per cent had lost weight and 51 per cent were stationary; between 7 and 12 years, 30 per cent had lost weight; and from 13 to 17 years, 16 per cent of boys and 24 per cent of girls had lost weight.

Cayla and his colleagues point out in *Presse Médicale* of Dec. 19, 1942, that loss of weight among children of the Paris schools is most

severe between 14 and 18, especially among the girls, and may be as much as 5 kg. Next in severity is the loss in the age group between 10 and 12; the younger children are less affected, probably because their parents stint themselves to feed them.

Tuberculosis is on the increase among school children and in certain centers the death rate has risen by 30 per cent. It affects especially children of 15 and over. The frequency and severity of rickets is due to shortage of calcium, because milk is scarce and very poor in quality. A syndrome very often seen among children nowadays is characterized by epigastric tension, abnormal volume of flatus, enormous feces, and often enuresis. The abdomen is big, tense, and resonant; growth is hindered and there are many psychomotor troubles which may be referred to as spasmodophilia.

According to Ribadeau-Dumas the diet, consisting almost exclusively of crude vegetable matter, causes an excessive elimination of calcium, which in any case is deficient in the intake. An excessive quantity of cellulose, especially ortho-cellulose, in the diet causes food to pass too rapidly through the digestive tract and so leads to an abnormal elimination of proteins as well as to the disturbance in the balance of chlorides and water.

Emphasis must be laid on the psychological disturbances which appear among young persons. The number of neurotic children suffering chiefly from kleptomania, pathological lying, enuresis, epilepsy, and sexual perversion, has increased disquietingly.

Deaths Among the Newly Born.—Many children born prematurely at eight months have the blood characteristics of a fetus of six months. In 1942, 21 per cent of the children in the big towns had between 3,000,000 and 4,000,000 red cells instead of 5,000,000 and this year the percentage is increasing. More than half of the newly born weigh less than 3 kg. Many miscarriages are due to undernourishment during pregnancy and some may be due to eating bread made of spurred rye. Before the war, rye was given mostly to farm animals, but it is now used for bread. Women are unable to nurse their children, and many parturient women show signs of osteomalacia.

Although this communication from Pétain to Hitler is clearly a "last straw" supplication for a bit of human kindness toward the undernourished millions of France, it is the first truly scientific report we have had on the canny pathology of wholesale undernourishment that has escaped the censors of German-Occupied Europe. It is published here as pathology of the underfed: infants, children, youth of both sexes, the pregnant, the adult worker—the aged have long since passed

from the scene. As if the better to serve its purpose, the report is cloaked in the suppressed emotions of scientific men. It concerns veterinarians in their quest for sufficient nourishment for the human population and also as citizens in the midst of a great war for the survival of our way of life.

The Journal's Objective

To those who compliment the JOURNAL for the monthly messages it brings; to the silent who may think that way; and to the discontented who join in hoping for bigger and better achievements, we express thanks.

The far cry for improved literary standards has brought favorable results by merely drawing attention to the virtue of good usage. The *American Journal of Veterinary Research*, as originally intended, has furnished the research workers an outlet for their excellent material; and the *Veterinary Science News Letter*, compiled each month for the Office of War Information to carry the AVMA's message to the four corners of the world, is an aid to the veterinary services of the United Nations.

But, there are other reasons why the Association is growing in affluence and in numbers. Its voice—the JOURNAL—has set out to cement the *scientific*, the *clinical*, and the *economic* components of veterinary medicine into a solid unit in behalf of the American people. The efforts have clicked, and they would always have clicked, no doubt, had not the economic side of our work been ignored through the sixty years of the profession's development in this country. Our ultimate purpose is mainly economic; science a means to that end.

The work of the Association's committees, on the diseases of the various species of farm animals, which publicize the essentiality of veterinary medicine in an agricultural nation like ours, are capturing the place the profession has long sought through broadcasting the knowledge of recognized experts, who have no axes of their own to grind. Their teachings are sought and heeded, as shown in the obedience of farm-animal diseases to them.

The JOURNAL's objective is to effect a fusion of science-clinic-economics, and to have the unit assessed at par value by all of the people without sacrificing its rat-

ing among scientific periodicals or the Association's Code of Ethics.

Science that "high hats" its utilitarianism is sure to labor unseen in the practical world of today.

"Brucellosis" vs. "Bang's Disease"

"Brucellosis," in lieu of "Bang's disease," is the term used by Chief Miller in his annual report of the United States Bureau of Animal Industry for the fiscal year ending June 30, 1943. We compliment the Chief for this aid in revising the nomenclature of an ubiquitous infection of man and animals for which "Bang's disease" no longer applies. Gradually, we hope, the revision will find favor in state laws and official documents, as it has in scientific literature.

The tobacco crop is not all used to appease a popular habit. Much of it goes for the production of insecticides and for the production of nicotinic acid. The raising of a species of Nicotina containing twice as much nicotine as ordinary tobacco, and not suitable for smoking, is among the agricultural projects of the future.



—U. S. Official

"Passing the ammunition" for the Yanks in China. Zealous champions of all-machine warfare call the animal toters of mail, ammunition, guns, and food, "the hay burners."

CURRENT LITERATURE

ABSTRACTS

Gramicidin and Tyrothricin in Mastitis

Cows affected with mastitis due to *Streptococcus agalactiae* may yield from 400 to 900 fewer pounds of milk per lactation and the milk is of inferior quality. Moreover, losses are also suffered from the removal of infected cows and the waste of labor brought about by low-producing cows. In many instances, affected cows can be returned to the milking line by the use of the bactericidal agents—gramicidin or tyrothricin—derived from the soil bacillus—*Bacillus brevis*. Most workers have agreed that these extractives are more effective than the dye type of germicides in use. The treatment should not be attempted where a strict program cannot be enforced. Precise diagnosis is paramount. The treatment should be administered by veterinarians. Drug treatment is an adjunct to sanitary measures, not a cure-all. But where carefully carried out, the productive life of many cows can be prolonged.—[Ralph B. Little, V.M.D.: *Gramicidin and Tyrothricin in Chronic Streptococcal Mastitis. Sixteenth Annual Report, New York State Association of Milk Sanitarians, 1942.*]

The Council on Pharmacy and Chemistry

There is perhaps nothing more remarkable in medicine than the achievements of the Council on Pharmacy and Chemistry of the American Medical Association which was established in 1905, or nearly forty years ago for the purpose of encouraging voluntary obedience to its recommendations as to what's what in medical matériel. The personnel consists of 17 scientists of the upper cadre, each of whom is connected with some outstanding medical center, and who is a recognized authority in the branch of medicine which he represents on the Council. The members work without compensation and no charge is made to the manufacturers. The cost of maintaining the Council is borne entirely by appropriations made by the association's Board of Trustees. Charges that Council approval "costs too much" or is influenced by advertisements in the AMA publications are vigorously refuted. The Council members have no knowledge of proffered advertisements. Their professional standing dis-

pels the thought. When an advertisement accompanies application for the approval of a product, the Secretary of the Council informs the applicant forthwith that there is no possibility that the advertisement will influence the Council's action. Testimonials from users are not considered. The Council regards one or two pieces of research more useful than several hundred signed testimonials based upon clinical response because physicians are not specialists in the many factors involved in arriving at safe conclusions. The principles, the work, and the achievements of the Council have served as patterns for the Council on Physical Therapy and the one on Foods and Nutrition, and is the model used by the American Dental Association.—[Austin E. Smith, M.D.: *The Council on Pharmacy and Chemistry, Membership, Activities, Methods of Operation, Attainments. J.A.M.A., 124, (Feb. 12, 1944): 433-439.*]

The Future of Nutrition

In the last three decades, knowledge of nutrition has changed the social order. Although long foreseen by physiologists and biochemists, few have visualized the possibilities dimly lurking in the offing until recent years. The whole economic and social structure is being assailed by the revolutionary changes that the nutritional laboratories are bringing about. They cast long shadows ahead, yet the metabolism of none of the major foodstuffs or minerals is completely known. The advance lies in new techniques in biochemistry which are providing a better insight into what constitutes normal nutrition, and in the utilization of the new knowledge in the practice of medicine. The physician is no longer leaving the matter of nutrition to the dietitians. The intelligent adult has become nutrition-conscious. Even those who shout the virtue of vitamin pills from the house tops will add their bit until good nutrition replaces the ill chosen synthetic vitamins in the home, school, and factory. Food producers follow the trends of popular demand. The fault lies in adult education. "Rationing which implies a degree of social responsibility is foreign to the thinking of many."

Good nutrition must be made an instrument of national and international policy and that

cannot be achieved without leadership of men of moral responsibility and large vision in all walks of life. If war checks the march of civilization it may also speed up reforms as in the case of a broader knowledge of nutritional needs.—[From *Nutrition Reviews*, 2, (Jan. 1944): 1-3.]

Sulfaguanidine for Typhoid Carriers

On the basis of studies made by Burroughs and Freyhan in Delaware, sulfaguanidine lacks prophylactic value in controlling the shedding of typhoid bacilli by the feces of a known carrier. A chronic typhoid carrier in an institution for mental patients, a woman carrier given the drug by mouth at the rate of 6 to 18 Gm. per day was still shedding the organism eighteen days after receiving a total of 174 Gm. Her carrier condition was in no degree modified by the treatment.—[Travis P. Burroughs, M.D., Delaware State Board of Health and F. A. Freyhan, M.D., Delaware State Hospital: Failure of Sulfaguanidine Therapy in the Control of an Institutional Typhoid Carrier. J.A.M.A., 133, (Nov. 20, 1948): 763-764.]

Horse Racing in Puerto Rico

Puerto Rico supports three race tracks, namely: *Las Monjas*, *Las Casas*, and *Quintana*, all mile tracks. At the present time the latter is occupied for military purposes. Races are held the year around on Sundays, Wednesdays, and holidays. The meetings of two weeks are alternated by agreement among the three corporations in charge. There are seven events for each racing day: four for native horses and three for imported Thoroughbreds. Distances, 1,000 meters to 1 1/4 miles for imported horses and 1,000 meters to 1 1/8 miles for native horses. Owing to the war, only 47 Thoroughbreds were brought to the island from the United States. The features are handicaps and claiming races of \$300 and up.—From *The Thoroughbred Record*, Feb. 19, 1944.

Staphylococcus Food Poisoning

Staphylococcal food poisoning is commonly caused by the soiling of food contained in lunch boxes, prepared for school or for work. Commercially prepared lunches are not exempt. The tendency to use leftovers in conserving food has increased the hazard. It is a true infection. As in typhoid fever, germs carried into the susceptible human body in food produce the intoxicant by multiplying in the digestive tract, whereas in botulism the toxin is formed in the food before it is eaten. Staphylococci lurk on unclean hands, fingernails, on the skin, in the throat, and huge quantities are present in pimples, boils, and carbuncles.

Symptoms develop two to four hours after eating, in the form of weakness, nausea, vomiting, abdominal pain, pallor, cold sweats, and diarrhea, which combine to make up a serious but seldom fatal syndrome. Poultry, ham, hamburger, tongue, egg and butter sauces, cottage cheese, and creamed foods, are particularly good mediums for staphylococcal growth. Personal cleanliness and minimum handling are the bases of prevention.—*Illinois Health Messenger*, Dec. 15, 1943.

Vitamin Synthesis in the Rumen

To function in normal fashion in the production of vitamins, the rumen cannot be expected to accomplish the impossible. While thiamin, riboflavin, nicotinic acid, pantothenic acid, vitamin K, and other micronutrients are made available to the organism through natural phenomena attributed to the rumen, chemical and physical balance of the intake cannot be ruled out in the feeding of ruminants because of that remarkable function. To synthesize these agents in ample amounts, the chemical and physical character of the feed delivered to the fabricating reservoir is as much a factor in the ruminant's nutrition as in the monogastric mammal, devoid of such synthesizing machinery. The activity of the bacterial flora responsible for the productive fermentation depends upon the medium furnished. It cannot synthesize much riboflavin, for example, from timothy hay nor as much of that B fraction from whole corn as from ground corn, nor is it as essential for the mechanism to function at all on alfalfa in producing riboflavin already present. Remarkable as the rumen is as a vitamin synthesizer, it cannot manufacture something from nothing. There is still much to be learned about the synthesis of vitamins by the rumen, although it is a fascinating study and one of outstanding importance in the feeding of ruminants.—[B. W. Fairbanks and J. L. Kridler, Department of Animal Husbandry, University of Illinois: Factors Involved in the Synthesis of Vitamins in the Ruminant. North Am. Vet. 25, (Feb. 1944): 97-100.]

Rape Poisoning in Cattle

Although a valuable forage crop, rape under certain conditions is injurious to livestock. It is most common in wet seasons followed by early frosts, such as prevailed in the fall of 1943. The crop under these conditions is more dangerous when the plant takes on a purple hue. The poisoning is rare in dry seasons with late frosts. The symptoms are respiratory, digestive, nervous, and urinary. The affected

animals stand apart from the herd and refuse feed and are loath to move when urged. The breathing is so violent that air escapes to the subcutem via ruptured alveoli and intercostal musculature. Other cases are more mild in these respects. The digestive upset is that of engorgement of the rumen, absence of peristalsis, and empty floating colon and rectum. The nervous symptoms are aimless wandering when driven and violent contact with fixed objects, lunging at mangers and dropping in a state of exhaustion. The urinary phenomena are similar to those of red water—hemoglobinuria.

Among the survivors, the convalescence is slow and treatment long.—[F. T. Cote: *Rape Poisoning in Cattle*. *Can. J. Comp. Med. and Vet. Sci.*, 8, (Feb. 1944): 38-41.

BOOKS

Veterinary Surgery Notes

This book is quite a complete treatise on farm-animal surgery, in abridged form. It covers a broad field without omitting the salient points of each title treated, and well-chosen references are keys to details a reader may desire to study. The techniques are delineated as completely as the brevity permits. Three chapters on general surgery, exclusive of wounds, neoplasms, and cysts, are followed by material organized as to regions: head, neck, limbs, thorax, abdomen, pelvis, vagina, rectum, and anus. The text has the ring of being based on having met the conditions described and of having treated them surgically. As authors up to this day have yet to standardize the techniques of even the major operations, interjecting a reviewer's ideas is out of order. Criticizing veterinary surgical techniques is like debating with the setting sun or revamping the colors of the other fellows rainbow. No one agrees, no one contradicts, no one changes his own set ways. It takes courage to write a book on animal surgery.

Everyone who follows the trend of animal surgery in this country has found many a logical reason for praising the work of Frank at Manhattan. His contributions to current literature, to the programs of veterinary medical associations, and his gradually expanding notes which he has made available for practitioners deserve a lot of praise because he presents his material with well-chosen illustrations of his own making, selects titles of interest in everyday practice, and tells what he has to disclose without prolixity. A practitioner about to perform a surgical operation will make no mistake in consulting the pages of this manual.—["*Veterinary Surgery Notes*," Revised Edition. By E. R. Frank, B.S.A., D.V.M., M.S.,

Professor of Surgery, Kansas State College. 237 pages, 11" x 8". Cloth. Profusely illustrated. Burgess Publishing Company, Minneapolis, Minnesota. 1944. Price \$5.00.]

Handbook of Poultry Nutrition, Revised Edition

The original edition of this book was reviewed at some length in the January, 1944, issue at which time we wrote "None would gainsay that no book covering the subject as completely was ever published." We wrote then of a book of 840 pages, published in 1941. Now comes a revision with over 400 pages added. New research and the mounting importance in poultry and egg production created the need of enlargement, the publisher writes, and not to be discounted is the fact that the first edition is sold out. In addition to the increment, some material has been condensed and some deleted. Written for the edification of feed manufacturers, hatcherymen, poultry breeders, salesmen and nutritionists, this treatise will be found extremely informative for students of veterinary medicine and of agriculture, and their teachers, the author having brought the 38 chapters abreast of the times. To cite but one example, we have no reference book that covers the subject of vitamins in poultry feeding as completely as Ewing's. A notable addition to the 300 tables, charts, and formulas is the new chapter on wartime poultry-feed formulas. One admires the author's handling of the controversial issues and the unknowns of the most intricate of all sciences and biological arts—nutrition. Possession of this book will please anyone of the large audience to which it speaks.—

[*Poultry Nutrition*. By W. R. Ewing. 1245 pages. 100 illustrations. 12 color plates. 2,000 references. Published by the author, South Pasadena, Calif. Price \$10.00.]

Proper Milking and Mastitis Control

Because of the war, the demand for milk is the greatest in the nation's history. Every effort should be put forth to produce the maximum amount of milk from the existing cows. Proper milking and reducing the incidence of mastitis are essential steps. Knowledge of mammary anatomy and physiology should be invoked and in the milking process, the cow must be made to coöperate because of the nervous mechanism involved, particularly in respect to stepping up the secretion of the hypophysis, for on arriving in the udder, the pituitary hormone causes contraction of the mammary musculature and forces down the milk. Likewise, excessive secretion of epinephrine, incited by fright, fear and pain, has the effect of making cows hold up their milk.

Mastitis, especially that caused by *Streptococcus agalactiae*, is related to improper milk-

ing and stable hygiene, to treat injuries which harbor microorganisms and facilitate their penetration, and to various types of exposure and feeding practices, all of which are intimately connected with the increase of milk production. The single-dose treatment of chronic cases of streptococcal and staphylococcal mastitis is recommended during the dry period and early in the course of the disease.

Discretion should be used in choosing the therapeutic agent as some have been found to be dangerous to the milk used immediately following treatment. Regular feeding and milking periods, fast milking, washing the udder, complete milking and stripping, avoiding disturbance, and good sanitation are all of paramount importance.—*Committee on Animal Health, National Research Council, Circular 120, November, 1943.*

When the "Vet" Comes

"When the 'Vet' Comes," is the title of a booklet (transcript) by Romeyn Berry, popular radio commentator, lawyer, farmer, and author published in the interest of the public relations of the veterinary profession. Of the farmer, milker, truckman, tester, and veterinarian, the latter is the one "we rely upon most heavily—we couldn't get along without him," the radio audience of WHCU and other stations was told. It gives a factual, fascinating, humorous, and highly complimentary broadcast of just what a veterinarian does. It is based on the commentator's personal observation on his own farm. You'll enjoy this transcript.—[Babson Bros., Company, New York, N. Y. A 12-page pamphlet.]

Conquest of Bacteria

"Conquest" is a strong term to use for the unfinished war against an enemy as strongly entrenched as bacteria. The implication is that the whole army of vegetable microbes has thrown down its arms before the advancing forces of General Domagk which is far from the truth, striking as the powerful weapon happens to be. The book is a treatise on the use of sulfonamides with introductory material taking one back to Aesculapius, Galen, Pasteur, Koch, Paul Ehrlich, and Lister and their respective contributions to the fight against disease. Quinine and mercury and arsenicals are pointed out to distinguish between the vulnerable Protozoa and the invulnerable bacteria which resisted all attacks 'till the "sulfa's" came onto the battlefield. The truth seems to be that malaria and syphilis are still at the top of human plagues and the fight on bacteria is hardly a "conquest," in as much as the mortality of certain bacterial diseases has been lowered by the Domagk discovery.

The chapters are titled "Bacteria and Dis-

ease," "The Body's Defenses," "The Development of Drugs," "The Rise of Chemotherapy," and five chapters on the known facts concerning the use of the various sulfonamides. The closing chapter is a strong and timely plea for more public funds to carry out scientific research which at the present time has to eke out an existence by and large on private enterprise.—[F. Sherwood Taylor: *The Conquest of Bacteria from Salvarsan to Sulphapyridine*. 175 pages. 11 formulas. Cloth. Philosophical Library, New York. Price \$5.00.]

Progress

Progress is the name of the Year Book of The Anti-Cruelty Society (Chicago) which tells what its name says about that humane organization, the headquarters of which we portray herewith. The building shown houses



Headquarters, The Anti-Cruelty Society, 157 W. Grand Avenue, Chicago 10, Illinois. Modern, spacious and well-managed home for humane society work.

the offices, kennels, clinic, and receiving station, all of which are directed by Dr. W. A. Young (I.S.C., '19), secretary of the Chicago Veterinary Medical Association, and designated as managing director of the Society. The report shows that of the total 97,008 animals dealt with during the fiscal year ending Oct. 31, 1943, there were 24,943 dogs received at these headquarters. Clinical subjects numbered 6,673. Besides, the inspection department dealt with 46,681 animals: horses, cats, dogs, poultry, and miscellaneous creatures. For the dogs, homes were found for 731, and 242 were returned to their rightful owners. The staff cooperates with the Chicago and suburban police departments to the extent of furnishing metal kennels in which stray animals picked up may be properly housed and fed until the Society calls for them.

The Society also maintains a department of humane education. A total of 148,693 pupils in the Chicago and suburban schools were reached during the year, having received instruction on the care, feeding, housing, and handling of their pets.

THE NEWS

Proposed Amendments to Administrative By-Laws

An amendment relative to the reorganization of the Committee on Education has been submitted in accordance with section 3, article XIII, of the Administrative By-Laws, which reads:

Section 3.—Excepting sections affecting the corporate officers provided in the constitution, the administrative by-laws may be permanently amended at any annual session by submitting, in writing, notice thereof to all the membership ninety days prior to the annual session at which final action is to be taken. Publication of proposed amendments in three consecutive issues of the JOURNAL shall be regarded as due notification to the members.

Proposal: Amend article XII, section 1.—“2. Committee on Education” so that it will read as follows:

a) Personnel.—This committee shall consist of seven members appointed by the president at the rate of one member per year, each to serve for a term of seven years. One member of the committee shall be appointed from each of the following branches of veterinary science; (1) teaching staff of a veterinary college accredited by the association, (2) federal veterinary service, (3) United States Army Veterinary Corps, (4) large animal practice, (5) small animal practice, (6) fulltime research in an educational institution of higher learning, (7) public health service. This committee shall elect a chairman and a secretary who will each serve for two years, or until their successors are elected and qualified. In the event of a vacancy resulting from death, resignation or disqualification from any cause, the president shall fill such vacancy by appointment of a successor from the same classification to serve the unexpired term.

b) Duty.—It shall make at least a biennial inspection of all accredited veterinary colleges to investigate veterinary education, including preveterinary, undergraduate and graduate study, enrollment, clinics, physical plant, equipment and faculty; suggest means and methods for improvement of the same and coöperate with the college officials in realization of these objectives in progressive, higher educational standards; and upon request, examine veterinary colleges seeking

accreditation by the Association. A copy of such inspection, report, and suggestions shall be sent to the dean of the veterinary school and to the president of the college or university.

c) It shall submit annually a list of such colleges as are recommended for accreditation by the Association and make a report on the status and needs of veterinary education as conducted in the existing veterinary colleges; on the relation of veterinary education to animal production; and on the number of qualified veterinarians required to maintain a competent veterinary service.

The above proposed amendment will be published in three consecutive issues of the JOURNAL and will then be in order for action by the House of Representatives at the annual meeting in August, 1944.

At present, this part of the administrative By-Laws reads as follows:

a) Personnel.—This committee shall consist of five members appointed by the president at the rate of one member per year, each to serve for a term of five years. Not less than three members of this committee shall be members of the teaching staffs of veterinary colleges accredited by the Association but no two members shall be of the same faculty or graduates of the same veterinary college.

b) Duty.—It shall make an annual report on the status and needs of veterinary education as conducted in the existing veterinary colleges; on the relation of veterinary education to animal production; and on the number of qualified veterinarians required to maintain a competent veterinary service for the American people. When deemed necessary, the committee is authorized to inspect veterinary colleges and submit annually a list of such colleges as should be accredited by the Association.

AMENDMENTS PROPOSED LAST YEAR FOR ACTION THIS YEAR

Two proposals were submitted at the annual meeting in 1943, which will come before the House of Representatives for action this year. One is to amend the Constitution, the other to amend the Administrative By-Laws.

Proposal No. 1: Amend article II of the Constitution to read as follows:

“The objectives of the Association shall be

to advance the science and art of veterinary medicine, including their relationship to the public health."

Proposal No. 2: Amend article IX, section 3, subparagraph (b), section 4, subparagraph (d) and section 5 so as to change the words:

"National Association of Bureau of Animal Industry Veterinarians" to "National Association of Federal Veterinarians" wherever the former designation, or abbreviations thereof, occur.

Joint Conference on Animal Allergies to Be Held in Chicago on June 9

Preceding the regular session of the American College of Allergy at the Palmer House, Chicago, on June 10-11, 1944, a joint informal meeting of veterinarians and members of the College will be held on the afternoon of June 9. The purpose is to discuss the general problem of allergies in animals with a view to organizing a veterinary section on immunology and allergy of the College. All veterinarians who are interested in the field of allergy are cordially invited to attend.

As a part of the conference, a brief program will be presented to which several outstanding authorities on allergy will contribute. This program will be published in the June JOURNAL.

Illinois Association Inaugurates Radio Series

The first of a series of radio talks on livestock and poultry health was given over station WLS, Chicago, on March 30, under the sponsorship of the Illinois State Veterinary Medical Association. Other talks will follow at monthly intervals until further notice, and will be part of the "Dinner Bell Program" heard at 12 o'clock noon over WLS on the last Thursday of each month.

Dr. L. M. Darst, of Princeton, Ill. presented the first talk on March 30, his subject being "Prevention of Losses in Newborn Pigs." The Illinois series is under the direction of the public relations committee of the state association of which Dr. L. A. Dykstra of Galesburg is chairman.

This makes the thirty-first state which is providing a series of talks as a contribution to the wartime food production program and is a public service jointly contributed by state veterinary associations and leading radio stations throughout the country. These programs got under way in several states from coast to coast during the first week of January, 1944, and the list has grown steadily since then. The addition of the Illinois association and WLS, "The Prairie Farmer Station," brings in one of the most influential stations in the Middlewest with

a very large farm audience, principally in Illinois, Indiana, Michigan, and Wisconsin.

Veterinary Science News Letters

Below is the table of contents of *Veterinary Science News Letter No. 10*. The material for these Letters is furnished to the Office of War Information each month by the editors of the JOURNAL. They are set up by OWI in mimeographed form of seven or eight pages, and distributed in numerous countries outside the Western Hemisphere. They are designed for the men who would like to see the JOURNAL or THE AMERICAN VETERINARY MEDICAL ASSOCIATION, but can not because of wartime mailing conditions. According to OWI: "It is felt that, by making such summarized information available, we can do a real service to the men in the veterinary field in the countries cut off from a large part of scientific news. By furnishing us with material for the *News Letters*, you will be doing news-starved colleagues and the cause of science a good turn."

Pathology of Pregnancy Disease (Toxemia) of Ewes (From *Australian Veterinary Journal*, Dec. 1943).

Gapeworm (*Syngamus Trachae*) Infection of Adult Chickens (From *Experiment Station Record*, Feb. 1944)

Whole Fish Diet Destroys Thiamin (Vitamin B₁) (From *Experiment Station Record*, Feb. 1944).

Cross Immunity Between Equine Encephalomyelitis and Equine Infectious Anemia (From *Canadian Journal of Comparative Medicine*, May 1943).

Flies as Carriers of *Salmonella Pullorum* (From *Canadian Journal of Public Health*, Feb. 1944).

Cultivation of *Pasteurella Tularensis* in Liquid Media (From *Public Health Reports*, Jan. 21, 1944).

Dicoumarin and Salicylates (From *J.A.M.A.*, March 18, 1944).

Synthesis of Vitamins in the Rumen (From the *North American Veterinarian*, Feb. 1944).

Tyrothricin in the Treatment of Bovine Mastitis (From *Veterinary Medicine*, Sept. 1942).

Milk-Serum Agglutination Test (From *Milk Technology*, Jan.-Feb. 1944).

Transmission of Brucellosis by Bulls (From *Journal of Comparative Pathology and Therapeutics* (London). April 1943).

Renewed Interest in Acridine Dyes (From the *J.A.V.M.A.*, May 1944).

Relationship of Teat Patency to Udder Infection (From *Cornell Veterinarian*, Jan. 1944).

Toxicity of Red Squill Rat Bait for Animals (From *Canadian Journal of Comparative Medicine*, August 1943).

Gonadotropic Hormone in Roosters (From *Poultry Science*, March 1944).

APPLICATIONS

The listing of applicants conforms to the Requirements of the administrative by-laws—Article X, Section 2.

First Listing

BABSON, OSMAN

339 Washington St., Gloucester, Mass.
D.V.M., Cornell University, 1934.
Vouchers: J. H. O'Brien and L. A. Paquin.

FISK, LOYAL H.

Lockwood, Mo.
D.V.M., Colorado State College, 1935.
Vouchers: J. L. Wells and Ashe Lockhart.

GEORGE, JOHN H.

P. O. Box 57, Mt. Blanchard, Ohio.
D.V.M., Ohio State University, 1943.
Vouchers: W. F. Guard and P. A. Soldner.

GRIFFIN, D. W.

P. O. Box 184, Chipley, Fla.
D.V.M., Alabama Polytechnic Institute, 1924.
Vouchers: J. V. Knapp and T. H. Applewhite.

HINCKLEY, D. F.

811 N. Noble, Watonga, Okla.
D.V.S., Kansas City Veterinary College, 1909.
Vouchers: D. H. Ricks and A. Lockhart.

HOYT, KENNETH R.

303 S. 8th, Klamath Falls, Ore.
D.V.M., Washington State College, 1935.
Vouchers: C. H. Seagraves and H. A. Wheeler.

KRESS, JOSEPH D.

Suffolk, Va.
D.V.M., Ohio State University, 1935.
Vouchers: F. H. Woodruff and E. P. Johnson.

Moss, LYLE A.

Rt. 2 Box 1034, Renton, Wash.
D.V.M., State College of Washington, 1933.
Vouchers: F. E. Smith and R. S. Adams.

NOTHOMB, H. V.

6919 Dodge St., Omaha, Neb.
D.V.S., Kansas City Veterinary College, 1908.
Vouchers: W. T. Spencer and J. E. Weinman.

PREUSSER, KARL R.

Veterinary Hosp., Ft. Sill, Okla.
D.V.M., Iowa State College, 1943.
Vouchers: I. A. Merchant and G. R. Fowler.

SNELLING, ALBERT M.

521 Henley St., Knoxville, Tenn.
D.V.M., Cornell University, 1931.
Vouchers: D. Coughlin and H. W. Hayes.

TOVELL, LEONARD H.

10416 S. Vincennes Ave., Chicago 43, Ill.
B.V.Sc., Ontario Veterinary College, 1938.
Vouchers: O. P. Sinnerud and A. G. Misener.

TREMAN, J. W.

2285 E. 4910 S., Murray, Utah.
D.V.M., Cornell University, 1905.
Vouchers: C. L. Jones and W. T. Huffman.

Second Listing

Bachtold, Gomez Martin, Zempoala 76 Col Narvarte, Mexico, D. F.

Beechwood, C. Theo., 120 State Capitol Bldg., Salt Lake City, Utah.

Bustamante, Rocuant Alejandro, Veterinario Jefe de la Division de Caballeria, Ejercito de Chile, Santiago, Chile.

Childers, R. R., Box 597, Jasper, Texas.

Delgado, Guerrero Luis, Algeciras No. 38, Mixcoac, D. F., Mexico.

DeValois, C. A., 720-4th Ave., Sheldon, Iowa.

Fernandez, Gomez Ruben, Calle de la Reina 100, Villa Alvaro Obregon, Mexico D. F.

Figueroa, Balvanuera Jose, Bellini 23, Guadalupe Trm., Villa Olregon, Mexico, D. F.

Funchess, George Thaddeus, Box 624, 317 N. Tenn. St., Graham, Texas.

Garrett, R. G., Box 68, Taylor, Texas.

Greer, C. McH., Box 666, Winnesboro, La.

Hastings, George H., Veterinary Station Hosp., Ft. Bliss, Texas.

Heaton, James W. Jr., 3519 Meadowbrook Dr., Ft. Worth, Texas.

Holmes, John M., Station Veterinarian, Hq. Camp Polk, La.

Ladron, Guevara Cassal Antonio, Dirección de Investigaciones Pecuarias, Calzada de los Maestros 116, Mexico D. F.

Little, Robert Dale, 1495 Pennsylvania Ave., Columbus 1, Ohio.

Magens, Hans J., Station Veterinarian, Camp White, Ore.

Mercado, Garcia Daniel, Nogal St. 157, Mexico, D. F.

Murch, R. Gordon, 138 Washington Ave., Chelsea, Mass.

Ortiz, Berumen Daniel, Santuario No. 9, Del Valle, Mexico City, Mexico.

Redden, Elwin M., 509 S. 6th St., Norfolk, Neb.

Rubio, Lozano Federico, 16 de Septiembre 407, Chihuahua, Chihuahua, Mexico.

Servals, Harold A., 1001 Stewart Ave., S. W., Atlanta, Ga.

Stilley, Louis E., 3731 Hilltop Rd., Ft. Worth, Texas.

Tellez, Giron Rode Alfredo, Parroquia 637, Mixcoac Mexico D. F.

1943 Graduate Applicants

First Listing

The following are graduates who have recently received their veterinary degrees and who have applied for AVMA membership under the provision granted in the Administrative By-Laws to members in good standing of junior chapters. Applications from this year's senior classes not received in time for listing this month will appear in later issues. An asterisk (*) after the name of a school indicates that

all of this year's graduates have made application for membership.

Michigan State College

BIGELOW, MYRON C., D.V.M.

Flushing Rd., Flushing, Mich.

Vouchers: E. K. Sales and F. Thorp, Jr.

Second Listing

Michigan State College

Goodband, G. Clifford, D.V.M., 411 Dedham, Newton Center, Mass.

Texas A. & M. College

Smith, Harold R., D.V.M., Princeville, Ill.

Washington State College

Bradbury, L. G., D.V.M., 624 W. Division, Mt. Vernon, Wash.

U. S. GOVERNMENT

BAI Annual Report.—The annual report of Chief A. W. Miller of the Bureau of Animal Industry to E. C. Auchter, agricultural research administrator, reviews the work for the fiscal year ending June 30, 1943, which (quoting) "dealt with intensified production of livestock through disease eradication and control, improved feeding and management, and new processing methods." The Bureau had on its roll 1,675 full time employees, exclusive of 380 on furlough for duty with the military forces. Of 859 classified as professional and scientific employees, 90 per cent were veterinarians, and of the 1,675 total on the roster, 1,505 were engaged in field work and 170 in the departmental service. Of special interest are a number of tabulated statistical records summing up the work accomplished in the various fields of activity. The work of the meat-inspection force is not included since that division is operated under the marketing and distribution administration.

• • •

"Doctors" for the Merchant Marine.—Merchant ships without surgeons are being provided, for the first time, with trained medical personnel through courses on care of the sick and injured given at the Marine Hospital which was established for the maritime service on Chicago's northside in 1873. This old landmark on the lake shore designated "the hospital corpsman school" has already trained over 1,000 capable handy men to "pinch hit" on the sea in the absence of physicians. After taking basic training, the medical apprentice is given a hurried twelve-week course in anatomy, physiology, hygiene, sanitation, first aid, emergency treatment, nursing, pharmacy, and clinical laboratory work, with the object of providing the best possible medical attention

to the luckless seaman of small or large crews caught without medical aid.—*From Regional Public Relations Officer, U.S. Maritime Service, Chicago.*

AMONG THE STATES

Alaska

Alaska lies in the same latitude as Finland, Norway, and Sweden, which have a combined population of 12 million, and it has a larger area than all these three countries.

Arizona

Dr. T. B. Jones, state veterinarian of Arizona for the past five years, recently resigned his position. He is succeeded by Dr. Vego Mikkelsen.

Dr. Jones resigned due to illness in his family and has moved to Carlsbad, Calif. where he will probably enter general practice this spring. He will welcome a visit from any of his friends who are passing through Carlsbad.

Alberta

With only the Americas comparatively free from the effects of the war [touch wood—Ed.] it may be that they will be called upon to serve as a world reservoir of healthy livestock for many years after the war and will be the only source of good breeding animals.—*From Veterinary News, Calgary.*

California

The State Meat-Inspection Service.—Chief Boyd, Bureau of Meat Inspection, reports that state meat inspection has grown to a vast project of the State Department of Agriculture. In 1943, 47,225,925 pounds of meat products were manufactured under state inspection. The number of pounds of meat products condemned was 79,409, or 0.16 per cent. The organs and parts condemned amounted to 1,101,337 pounds, and in addition 247,738 pounds were condemned under state-approved municipal inspection.

The total annual slaughter under federal, state, and municipal meat inspection during 1943 was 6,346,868 animals: cattle, sheep, calves and hogs. The author estimates that 22,000 cattle, 30,000 calves, 55,000 sheep, and 80,000 hogs were slaughtered uninspected on farms.

• • •

Association Meetings.—A joint meeting of the Southern California and Small Animal Veterinary Medical Association was held Feb. 29, 1944, at the Cabrillo Hotel, Los Angeles. J. N. Ritchie, M. R. C. V. S. of the Ministry of Agriculture of England, was the guest speaker. Another joint meeting of these two associations

was held March 14 at Clark Hotel. Otto Stader of Ardmore, Pa., showed motion pictures on the Stader splint and spoke on the Green method of treating and preventing canine distemper.

• • •

The Radio Broadcast Program.—L. M. Hurt, member of the Executive Board of the AVMA, spoke in the name of the California State Veterinary Medical Association over KFI during the Farm Hour on the veterinarian's part in guarding the nation's food supply through maintaining the health of livestock. The facts were well told.

s/ JOHN L. TYLER, Resident Secretary.

• • •

Breeding Foundation Organized.—Prominent figures in the horse racing circle have formed the California Breeders Foundation with the object of bringing the state back to the high level it occupied in horse breeding and racing during the heyday of Leland Stanford, "White Hat" McCarty, and other horse breeders of the first rank at the turn of the century, whom equine breeding history still honor as steadfast advocates of scientific breeding practices and upper bracket sportsmanship. Among the directors of the Foundation are Walter McCarty, Bing Crosby, Charles Howard, and Carl Burke. An initial step of the project is the purchase and equipment of a ranch to serve as the center of the Foundation's activities. It has never been clear why Kentucky bluegrass superseded California hay as the maker of race horse prodigies.

Florida

The fifty-day Hialeah Park (Miami) race meeting was the best supported in the state's history, the \$15,000 Flamingo Stakes (Feb. 29) drew an audience of 17,262 which slipped \$1,019,514 to the bookies. The winner was the St. Louis horse, Stir Up, 12 to 1.

• • •

State Association.—The F. V. M. A. award of a \$25.00 War Bond for the winner of first place at the Southeastern Fat Stock Show and Sale held in Ocala, Feb. 24, 1944, went to Miss Jeanette Zetrouer, 17, 4H Club girl of Micanopy. Fourth place went to Miss Betty Griffin, 13, of Chipley, daughter of Dr. and Mrs. D. W. Griffin, in the 4H competition. Betty's exhibit won eighth in the championship class and sold for \$268.10 to a Miami merchant. The significance of these events lies in what they represent in the breeding of better cattle and, since tick eradication has been completed, great strides have been made in the improvement of the cattle industry in the Southeast, particularly in



Miss Betty Griffin and Her 790-lb. Polled Shorthorn Steer, Snowball.

Florida. President V. L. Bruns, of the state association, made the presentation to Miss Zetrouer. She also received an \$8.00 cash prize and a \$100.00 scholarship from the state department of agriculture.

s/ T. H. APPLEWHITE, Resident Secretary.

Illinois

McLean County Association.—The March 14 meeting at Bloomington drew an attendance of 40. W. B. Holmes, Jensen-Salsbury Laboratories, showed motion pictures; A. K. Kuttler, of the BAI, discussed scabies; and L. A. Dykstra, Cutter Laboratories, Galesburg, conducted a round table session on mastitis.

s/H. T. CLABNO, Secretary.

• • •

Chicago Association.—Mr. Charles Snyder, editor of *Drover's Journal*, spoke on "The Veterinary Service and the Livestock Industry" at the regular monthly meeting held at the Palmer House April 11, 1944. Faced with another national convention, the monthly meetings of the C. V. M. A. take on ever-increasing responsibilities.

When you buy a War Bond you help to build up the reserve needed to prevent the ghastly fate of the jobless when the war is over. Every bond is a unit of postwar buying power—a prophylactic of catastrophic postwar depressions.

Northern Illinois Association.—Before one of the largest audiences in its history, the N. I. V. M. A. carried out the following program at its meeting in Rockford, March 22, 1944:

Ray Klussendorf, Columbus, Wis.: "Calf Scours."

W. L. Boyd, University of Minnesota, "Bovine Sterility."

George H. Hopson, The DeLaval Separator Company, New York: "The Milking Machine."

W. E. Beanblossom, Dixon, formerly Professor of Animal Husbandry, Iowa State College: "The Relationship of Veterinarians to Food Production." (Banquet address.)

The officers of the Association are: A. A. Turner, Freeport, president; W. G. Hoyt, Dundee, vice-president; W. D. Daugherty, Sterling, secretary-treasurer. The Ken-L-Products Division of Quaker Oats Company furnished refreshments, and 17 well-known commercial firms helped to defray expenses.

s/ W. D. DAUGHERTY, Secretary-Treasurer.

* * *

Mississippi Valley Veterinary Medical Association.—The Association will hold a picnic on June 18, 1944, at Lake Storey, Galesburg, Ill.

Indiana

Northwestern Association.—The Northwestern I. V. M. A. held one of its lively meetings at the luxurious animal hospital of Glenn L. Ebright, March 23, 1944, and wound up with a dinner session at the famous Phil Schmidt's, C. L. Miller of Oak Park, Ill., officiating as toastmaster.

The technical program consisted of a lecture on renal physiology by A. H. Craige, Jr., Allied Laboratories, Indianapolis; S. F. Scheidy, Sharp and Dohme, Glenolden, Pa., spoke on sulfa drugs, and W. C. Glenney, Elgin, Ill., exhibited motion pictures on rural practice. D. M. Campbell, editor of *Veterinary Medicine*; H. Preston Hoskins, editor of the *North American Veterinarian*, and L. A. Merillat, editor of the *JOURNAL of the American Veterinary Medical Association*, were guest speakers at the dinner.

Iowa

Southwestern Iowa Association.—The Southwestern Iowa Veterinary Medical Association held its spring meeting Apr. 4, 1944, at the Chieftain Hotel, Council Bluffs, Ia. The program follows:

C. C. Franks, Des Moines, Ia.: "Bang Vaccination and Testing of Calves for Sale."

R. A. Packer, Ames, Ia.: "Report and Discussion of Treatment of Chronic Bovine Mastitis."

J. D. Shoeman, Atlantic, Ia.: Conducted a Bovine Question Box.

H. C. Smith, Sioux City, Ia.: "Experimental Work with Pneumonias and Pulmonary Edema of Swine with Reference to Use of Sulfonamides."

A. H. Blair, Irwin, Ia.: Conducted a Swine Question Box.

C. D. Lee, Ames, Ia.: "Discussion of Poultry Diseases."

E. R. Frank, Manhattan, Kan.: Bovine Surgery (movie film).

s/ R. S. BEAVER, Secretary-Treasurer.

Kansas

Kansas Veterinary Medical Association.—Secretary Charles W. Bower recorded a meeting of the Association Dec. 29-30, 1943, at the Allis Hotel, Wichita, Kan. On the program were:

E. F. Sanders, Kansas City: "Vesicular Stomatitis in Swine."

L. A. Hammer, Clearwater: "Poultry Practice."

E. E. Leasure, Manhattan: "Nutrition of Farm Animals."

J. F. Knappenberger, Hutchinson: "Brucellosis."

For 1944 the Association elected M. P. Schlaegel, president; Charles W. Bower, secretary-treasurer.

Many of the K.S.C. alumni were present at the meeting.

s/ C. W. BOWER, Secretary-Treasurer.

Manitoba

The fifty-fourth annual meeting of the Veterinary Association of Manitoba was held at the Fort Garry Hotel in Winnipeg, Feb. 11, 1944. On the program were:

E. J. Rigby, Chief of the Dairy Division: "The Trend in Milk Inspection."

H. A. Watson, Supt. of the Food and Drug Laboratory: "Present Day Drugs and Their Control."

R. J. Kirk, Pathologist of the Experimental Fur Farm: "Distemper in Fur-Bearing Animals."

D. J. Lawson, Shoal Lake: "Photosensitization."

Leslie Hancock, Livestock Products Grader: "Hot Grading."

A symposium on swine diseases was led by **H. H. Ross**, Brandon; **A. Savage**, **J. W. Fasken**, and **H. R. McEwen**, Winnipeg. The following officers were elected: **E. J. Rigby**, Winnipeg, president; **J. Arbuthnott**, Portage la Prairie, vice-president; **Wm. Hilton**, Winnipeg, secretary-treasurer.

Michigan

In Dean Giltner's annual report of the Division of Veterinary Medicine, Michigan State College, the alumni in the military service as of 1943 were:

Colonel	1	1st Lts.	62
Lt. Colonel	1	Privates	2
Majors	8	Unknown	4
Captains	21	Total	99

Since the division was founded in 1913, 545 have been graduated. During the first 22 years, the average number of graduates was 8 as compared with 38 for the past ten years and 60 for the past four years. Four members of the teaching staff were given leave of absence because of war service.

Minnesota

The State Board of Medical Examiners revoked the license of a Minneapolis physician for associating himself with two unlicensed assistants at the "Health Institute" of Minneapolis which he was conducting. The action followed the death of a cancer victim who was charged \$485 for a quota of capsules pronounced worthless in the treatment of cancer.

Missouri

"Vets Reign Supreme" is the title of an editorial in *Missouri Ruralist*, one of the pioneer farm papers, in reporting that Dr. John W. Riley of Wright City officiated as chief judge of livestock at the Mexican National Exposition in December. Dr. Riley is quoted as stating that there are 300 veterinarians in Mexico, D. F., that purebred cattle are popular; Brahmans were the most numerous. President Emanuel Comacho, who is a breeder of light and heavy horses, was one of the exhibitors. . . . There will be a good outlet for purebred stock in Mexico.

New York

Memorable Celebration.—On Tuesday evening, March 21, 1944, at the Hotel Pennsylvania, New York City, four of six surviving members of the class of '94 of the New York College of Veterinary Surgeons held a reunion and dinner to celebrate the fiftieth anniversary of their graduation.

The class members who were present were Robert S. MacKellar, Sr., Wm. M. Fleischman, John C. Petersen, and A. J. Tuxill.

Reuben C. Gross of Elizabethtown, Pa., could not attend on account of illness, and R. M. Olbeter of Clayton, New Mexico, could not come on account of distance.

Guests at the dinner were Dr. Adolph Eichhorn and Mrs. Eichhorn, Mrs. MacKellar, Mrs. Fleischman, and Mrs. Petersen.

The occasion was a very enjoyable one, and each of the members present gave a synopsis of their experiences of half a century as veterinarians. Dr. Eichhorn also gave an interesting account of his work since he graduated with the class of 1900.

s/ R. S. MACKELLAR, Chairman.

Ohio

Death of Albert O. Hayes.—Albert O. Hayes, business manager of *Breeder's Gazette*, who passed away in February at his home in Clark county was a member of the first 4-H club in the United States and one of the first breeders of dairy cattle to own a tuberculin-tested herd. Before joining the Gazette staff, he was the Purina representative in northern Ohio. His hobbies were livestock improvement and the production of wholesome milk, two of the most laudible of human ambitions.

Deaths

Pennsylvania

Seeing-Eye Dogs for Veterans.—Senate Bill 1726, introduced by Senator Davis of Pennsylvania proposes an appropriation of \$5,000,000 to provide seeing-eye dogs for blind veterans who are entitled to disability compensation.—*From J.A.M.A. March 4, 1944.*

Saskatchewan

Fifteen cattle owners of the province were awarded Senior Herd Honour Certificates by the provincial Department of Agriculture, that is to say, herds of at least 15 cows which for thirteen years have produced a yearly average of 300 pounds of butterfat per head. The award is based on tests conducted by department inspectors. All of the cows in the competition are tested one day of each month during the period by the inspectors and the findings of the monthly check test are added to the record of each cow's daily performance.—*From Veterinary News (Calgary), March, 1944.*

Texas

State Association.—The semiannual meeting of the T. V. M. A. was held at Hotel Texas, Fort Worth, Feb. 25-26. Attendance, 120, out of a total paid up membership of 136. A jovial highlight of the program was the presentation of President C. W. Bower of the AVMA with a "Texas hat" and declaring him an adopted Texan. Prominent guest speakers were R. G. Green, M. D., Fromm Laboratories, Grafton, Wis.; Mark Welsh, Lederle Laboratories, Pearl

River, N. Y.; L. A. Dykstra, Cutter Laboratories, Galesburg, Ill.; and L. F. Wilson, Summit, N. J. Hon. J. E. McDonald, State Commissioner of Agriculture, and Lt. Col. J. R. Ludwig, V. C., U. S. Army, addressed the meeting. The State Board of Veterinary Examiners gave examinations to seven applicants for license to practice in the state.—*From the Texas Veterinary Bulletin, February, 1944.*

Virginia

A bill introduced in the state legislature proposes to prohibit the sale and distribution of hormone drug preparations, natural or synthetic, except on the prescription of a physician, dentist, or veterinarian. The bill is identified as S.234.

COMING MEETINGS

District of Columbia Veterinary Medical Association. Mayflower Hotel, Washington, D. C., May 9, 1944. W. H. Mohler, 5508 Nebraska Ave., N.W., Washington 15, D. C., secretary-treasurer.

Michiana Veterinary Medical Association. "All Cattle" clinic, Goshen, Ind., May 24, 1944. W. G. Magrane, Route 2, Mishawaka, Ind., American College of Allergy. Palmer House, Chicago, June 10-11, 1944. (Joint conference on allergies in animals will be held on after-

noon of June 9. All veterinarians interested in allergy are invited.) Fred W. Wittich, M.D., 401 LaSalle Medical Bldg., Minneapolis 2, Minn., secretary-treasurer.

South Carolina State Veterinary Medical Association. Wade Hampton Hotel, Columbia, S. Car., June 26-27, 1944. R. A. Mays, 415 Calhoun State Office Bldg., Columbia, S. Car., secretary-treasurer.

Missouri Veterinary Medical Association. Jefferson City, Mo., June 26-27, 1944. J. L. Wells, Box 676, Kansas City, Mo., secretary-treasurer.

North Carolina State Veterinary Medical Association. Carolina Hotel, Raleigh, N. C., June 28-29, 1944. J. H. Brown, Tarboro, N. C., secretary.

Virginia State Veterinary Medical Association. Hotel Roanoke, Roanoke, Va., July 12-13-14, 1944. E. P. Johnson, Box 593, Blacksburg, Va., secretary.

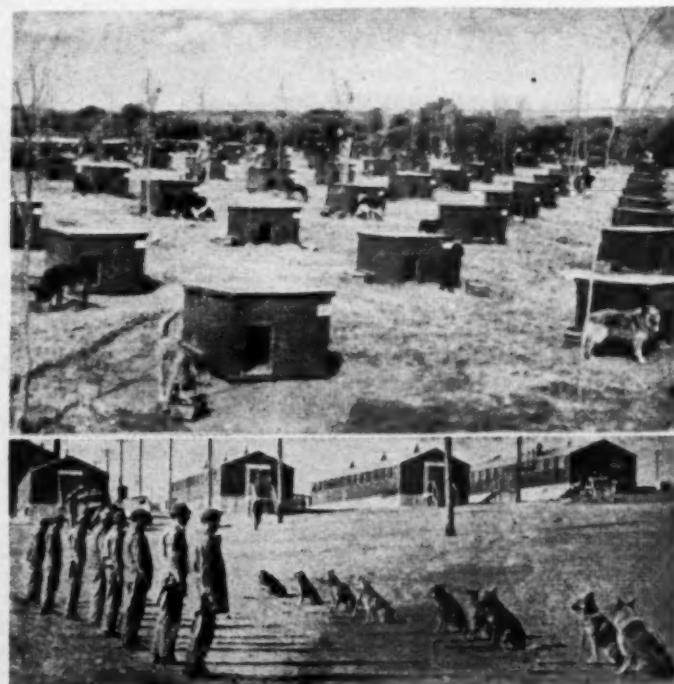
American Veterinary Medical Association, eighty-first annual meeting. Palmer House, Chicago, Ill., Aug. 22-24, 1944. J. G. Hardenbergh, 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

American Public Health Association. Hotel Pennsylvania, New York, N. Y., Oct. 3-5, 1944. Reginald M. Atwater, 1790 Broadway, New York, N. Y., chairman, program committee.

Short Course for Veterinarians. Purdue University, Lafayette, Ind., Oct. 5-6, 1944. C. R.

Some installations of the K9 Corps, A.U.S., at Fort Robinson, Nebraska. The upper picture is but a fraction of the vast area devoted to the individual 2-room houses. The entrance faces south, and bedroom is in the rear.

The lower picture shows the soldiers' barracks, the training ground, and dogs taking lessons in obedience. The pictures are U.S. Official photographs.



—*From National Humane Review*

Donham, Dept. of Veterinary Science, Purdue University, head.

Eastern Iowa Veterinary Medical Association. Hotel Montrose, Cedar Rapids, Iowa, Oct. 10-11, 1944. C. C. Graham, Wellsburg, Iowa, secretary.

United States Live Stock Sanitary Association. LaSalle Hotel, Chicago, Ill., Dec. 6-7-8, 1944. R. A. Hendershott, Trenton, N. J., secretary-treasurer.

MARRIAGES

Lt. Robert L. Pyles (K.S.C., '43), 1601 Walker Ave., Kansas City, Kansas, to Miss Ruth Adams, Sept. 1, 1943.

Dr. L. R. Karmin (CORN., '43), 390 Eastern Parkway, Brooklyn 25, N. Y., to Miss Roslyn E. Einhorn, Nov. 21, 1943.

Lt. Charles E. Whiteman (K.S.C., '43), A.S.C. Training Center, Fresno 2, Calif., to Miss Helen Majory McVey, December 28, 1943.

Lt. Lester H. Burkert (K.S.C., '43), 2840 Forest, Kansas City, Mo., to Miss Helen Lambert, March 5, 1944.

BIRTHS

To Lt. (K.S.C., '43) and Mrs. Leslie O. Foelschow, 2849 Balboa St., San Francisco 21, Calif., a daughter, Carolyn, Sept. 11, 1943.

To Dr. (K.S.C., '34) and Dr. Melvin Rabstein, Livestock Sanitary Service Laboratory, College Park, Md., a daughter, Oct. 12, 1943.

To Capt. (K.S.C., '41) and Mrs. C. H. Thompson, Air Depot Training Station, Albuquerque, N. Mex., a son, Leslie Lee, Jan. 11, 1944.

To Capt. (K.S.C., '41) and Mrs. Glenn E. Duncan, Memphis QM. Depot, Memphis, Tenn., twin daughters, Mary Ellen and Majorie Ann, February 12, 1944.

To Lt. (K.S.C., '36) and Mrs. A. S. Rosenwald, Camp Detrick, Md., a daughter, Joan Dae, Feb. 28, 1944.

To Dr. (K.S.C., '41) and Mrs. V. K. McMahan, Dept. of Pathology, Kansas State College, Manhattan, Kansas, a son, Thomas Keith, March 5, 1944.

To Lt. (I.S.C., '42) and Mrs. C. T. Orton, Camp Atlanta, Atlanta, Neb., a daughter, Pasty Carol, March 17, 1944.

DEATHS

D. W. Ashcraft (O.S.U., '32), aged 48, Columbus, Ohio, died April 9, 1944. He was admitted to AVMA in 1924.

Horace L. Anderson (Ont., '16), died Mar. 1, 1944. Colonel Anderson was serving with the armed forces as station veterinarian at Camp Bunker, North Carolina. Before joining the armed forces, he and his family had lived at Durham. He had been a member of AVMA since 1919.

Hubert H. Harz (C.V.C., '05), aged 59, Plano, Ill., died Dec. 23, 1943, of a heart attack. He had been a member of AVMA since 1939.

S. S. Huston (K.C.V.C., '11), longtime branch manager of the Norden Laboratories at Davenport, Ia., died in retirement March 3, at his home at Salem, Ore., where he had lived since 1941. He is survived by his widow and three children.

Mathias S. Lantz, aged 76, died at Portland, Oregon, Mar. 1, 1944. He was a graduate of the United States College of Veterinary Surgeons and was serving in the Bureau of Animal Industry as inspector in charge of the meat inspection station, Portland, at the time of his death.

William Ray Lukens, aged 54, died recently at Hillsboro, Ohio. His standing in his profession was acknowledged by his fellow practitioners when they made him president of the Ohio State Alumni Association of Veterinary Medicine. Dr. Lukens was a valued citizen of the community. He was admitted to AVMA in 1928.

Thomas McCrea Mathews (Ont., '33), Hamilton, Ontario, died Jan. 20, 1944. He had carried on a small animal practice for the past ten years at Hamilton and was active up to the time of his death. He had been a member of AVMA since 1938.

Benjamin F. Ricebarger (Ont., '06), aged 75, Saint Charles, Ill., died Mar. 12, 1944. He was admitted to AVMA in 1915.

George H. Sessions (McKillip, '10), aged 65 died Mar. 6, 1944. Dr. Sessions had practiced his profession at Miller, S. D., since graduation.

Walter E. Sharp (U.P., '04), aged 63, Newton, Ia., died Mar. 23, 1944. He was a past president of the Central Iowa Veterinarians Association and was admitted to AVMA in 1907.

Ortho O. Wolf, aged 70, Ottawa, Kan., died Mar. 31, 1944. Dr. Wolf was a prominent farmer and stockman and was nationally known as a farm organization leader. He held offices in many farm organizations during his lifetime, serving as a director of the American Farm Bureau federation and the National Livestock Marketing association. He also was secretary-treasurer of the Midwest Wool Marketing association, director of the National Wool Growers association, and vice-president of the State Fair association.

THE VETERINARY PROFESSION AND THE WAR

The Deferment Status of Veterinarians and Veterinary Students Under Current Occupational Classifications

(The following is published for the information of the veterinary profession because of the importance of recent developments.)

Draft quotas based on estimated requirements of the Army and Navy caused Selective Service Headquarters to issue instructions, during the latter part of March and early part of April, to state directors and local boards which limited the occupational deferment classification of registrants under 26 years to a relatively small list of "critical activities." The resulting interpretations were such, in most states, as to cause numerous reclassifications of essential veterinarians under 26 into Class 1-A and many of these individuals received orders for induction in the immediate or near future.

Because the needs of the Army Veterinary Corps for officer personnel have been met since the fall of 1943 by ASTP graduates, inducted veterinarians at present have no opportunity to obtain commissions and use their professional skills in the Army. The threatened wastage of veterinary manpower so badly needed to maintain civilian and governmental services at once became a serious consideration. A telegram setting forth the situation was sent to Selective Service Director Lewis B. Hershey on March 29, 1944. Under date of April 4, the Manpower Division of Selective Service replied by letter, stating:

"This will acknowledge your telegram of March 29, 1944, with reference to the deferment of veterinarians.

"Doctors of veterinary medicine are considered as necessary to the health and welfare of the nation. Local Boards have been instructed to give consideration to classification in an occupational classification when they are essential to a community and not replaceable. If the local board does not continue them in an occupational classification, they are entitled to all of the

rights of appeal which have been established in the Selective Service System."

(Signed) G. TINSLEY GARNETT,
Lt. Colonel, Signal Corps
Manpower Division.

In the meantime, information received from several states showed a growing tendency to reclassify and induct essential veterinarians. Accordingly, conferences were arranged in Washington between members of the Advisory Committee on Veterinary Medicine of the Procurement and Assignment Service and representatives of the War Manpower Commission, Selective Service, and other government agencies. These were held during the week of April 3 and, on April 8, the veterinary manpower situation was presented to the Directing Board of the Procurement and Assignment Service; a formal statement was also filed, which was later presented by the Board to representatives of Selective Service and the Army and Navy.

A meeting of the Advisory Committee on Veterinary Medicine was held in Washington on April 11 and was attended by Drs. John R. Mohler, Cassius Way, and J. G. Hardenbergh. Because of the inability of the other two members, Drs. W. A. Hagan and H. W. Jakeman, to attend, Drs. O. V. Brumley and H. W. Schoening were present as consultants. The purpose of the committee meeting was to review the classification status of essential veterinarians and the procedures necessary to obtain deferment consideration for them under the provisions of Local Board Memorandum No. 115 as amended April 4, 1944; to study the student situation in accredited veterinary schools as affected by the memorandum, and to formulate recommendations to help insure the maintenance of veterinary services needed by civilian and governmental agencies.

ESSENTIAL VETERINARIANS AND VETERINARY STUDENTS INCLUDED IN CRITICAL ACTIVITIES LIST

The decisions of National Headquarters of Selective Service in respect to deferment eligi-

bility of registrants ages 18 through 25 were contained in advices sent to state directors on April 11. These included a list of critical war activities other than agriculture and the names of the federal government agencies having jurisdiction over them.

STUDENTS

The item concerning students names the National Roster of Scientific and Specialized Personnel as the agency and rescinds instructions sent out April 4, 1944, regarding their occupational deferment. It provides that state directors will recommend exceptions to the general restriction against the occupational deferment of certain students and internes in the 18 to 26-year-old group by indicating on special forms their recommendation and the deferment time specified as follows:

1) Registrants pursuing fulltime courses of study in recognized colleges or universities in the following scientific and specialized fields, provided they will graduate before July 1, 1944, and no deferment for such registrants shall extend beyond that date: Aeronautical Engineering, Agricultural Sciences, Automotive Electrical Engineering, Forestry, Geology, Geophysics, Marine Engineering, Mathematics, Mechanical Engineering, Meterology, Mining and Metallurgical Engineering, including Mineral Technology, Naval Architecture, Optometry, Petroleum Engineering, Pharmacy, Physics, including Astronomy, Radio Engineering, Sanitary Engineering;

2) Registrants pursuing fulltime courses of study in Medicine, Dentistry, Veterinary Medicine, and Osteopathy, in recognized schools of Medicine, Dentistry, Veterinary Medicine, and Osteopathy until their graduation;

3) Registrants pursuing fulltime courses of study in pre-Medicine, pre-Dentistry, pre-Veterinary Medicine, pre-Osteopathy, and pre-Theology until their graduation if they are in recognized colleges and universities, provided such registrants have been accepted for admission in and will matriculate and enter into actual classroom work in a recognized school of Medicine, Dentistry, Veterinary Medicine, Osteopathy or Theology on or before July 1, 1944;

4) Registrants having completed their professional training and preparation as medical doctors, dentists, or osteopaths and are undertaking further studies in a hospital or institution giving a recognized internship, provided the total period of such internship shall not exceed nine months.

GRADUATES

The item relating to essential graduate veterinarians named the Procurement and Assignment Service as the federal agency hav-

ing jurisdiction and included Doctors of Medicine, Dentistry and Veterinary Medicine.

Part II of Local Board Memorandum No. 115, as amended, contains special provisions regarding occupational deferments. Under these provisions, no registrant ages 18 through 25, may be considered a "necessary man" entitled to be placed or retained in Class II-A or Class II-B unless there is filed with his local board a Form 42-A Special upon which the state director of Selective Service, in which state the registrant's principal place of employment is located, has endorsed a statement that, based upon the information in the Form, he recommends that the local board except the registrant from the general restrictions against the occupational deferment of registrants of ages 18 through 25. When at any time prior to induction, a Form 42-A Special, executed as required, is received by a local board for a registrant ages 18 through 25, the local board will reopen and consider anew the classification of such registrant.

The developments cited in the foregoing account make it imperative that every veterinary registrant of draft age be engaged in essential work and keep in close touch with the State Chairman for Veterinarians of the Procurement and Assignment Service in his state so that, if necessary, the required procedures relative to filing the required forms may be carried out or, if this fails, that all the rights of appeal set up by the Selective Service System are exercised.

Can You Help Locate These Members?

The aid of JOURNAL readers is solicited in locating the following members, mail to whom has been returned to the Association's central office. The last known address of each is given. Should you be able to provide information as to present residence, your advice *via* postcard or letter will be greatly appreciated.

Aasen, Stephen W., Marshfield, Ore.

Bowie, B. S., Nimmons, S. Car.

Bradley, W. B., Byron Center, Mich.

Koll, Harry, 4116 Pershing, El Paso, Texas.

Robertson, D. S., Station Hosp., Ft. Sam Houston, Texas.

Rodgers, Robert J., Gen. Del., Smithville, Texas.

Siver, Dougal, 429 Wrightwood Ave., Apt. 1-N, Chicago, Ill.

Tyler, Lindy, 805 Burlingame Ave., Burlingame, Calif.

Wion, John E., 708 Remington St., Ft. Collins, Colo.

PUBLICITY

To aid in avoiding a widespread outbreak of Equine Encephalomyelitis in 1944 (which would be a national calamity in war time), for the third consecutive year we are engaging in a widespread publicity campaign through farm papers emphasizing the importance of early, preseason immunization of horses by veterinarians. These advertisements appear in:

Weekly Kansas City Star
Prairie Farmer
Wisconsin Agriculturist
The Farmer
Wallace's Farmer
Dakota Farmer
Western Farm Life
Nebraska Farmer

Total farm circulation over two million.

Available information shows that while there was no serious outbreak of encephalomyelitis in 1943, a sufficient number of cases occurred throughout the infected territory to prove that the disease is still with us. Without widespread annual vaccination a serious outbreak could occur this summer.

Our 1944 ENCEPHALOMYELITIS VACCINE

is now being distributed, and adequate supplies are available either direct or from reputable jobbers throughout the United States.

ASHE LOCKHART, INC.

"Producers of Better Biologicals
for Graduate Veterinarians."

800 Woodswether Road

Kansas City 6, Missouri

In Canada—Canada Representatives, Ltd., 193-195 Spadina Ave., Toronto, Ontario

Member Veterinary Exhibitors' Association

A NEW CONCEPT FOR PREVENTION AND TREATMENT OF THE

Calf Scour - Pneumonia Complex



Jen-Sal

CALF CAPSULES

(PHILLIPS)

The polyvitamin formula cited by Dr. Paul H. Phillips, Department of Biochemistry, University of Wisconsin, at the December, 1943, U. S. Livestock Sanitary Association meeting . . . based on the published research reports of Phillips et al.; *Journal of Dairy Science*, 24-p. 977

IT NOW APPEARS CONCLUSIVE that the first step in prevention of the calf scour-pneumonia complex is to be sure every calf has an optimum supply of essential vitamin elements—especially vitamin A—from birth through the first few weeks of life.

For Routine Prophylaxis:

One capsule daily, starting immediately after birth.

In Clinical Cases: Three capsules daily as adjuvant therapy to other treatment.



THE CAPSULE FORMULA

VITAMIN A	5,000 units
VITAMIN D	500 units
NIACIN (Nicotinic Acid)	50 milligrams
ASCORBIC ACID (Vitamin C)	250 milligrams

Calf Capsules (Phillips) are now available for immediate distribution in
Bottles of 100 \$3.30
(Less Usual Discounts)

WRITE FOR DESCRIPTIVE LITERATURE

JENSEN-SALSBERRY LABORATORIES, INC.

KANSAS CITY, MISSOURI